



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



5 00382 631 3

ity of Michigan - BUHR









610.5  
R89  
M5t



# MEDICO-CHIRURGICAL TRANSACTIONS.

75443

PUBLISHED BY

THE ROYAL  
MEDICAL AND CHIRURGICAL SOCIETY

OF

LONDON.

---

VOLUME THE SIXTY-FOURTH.

---

LONDON:  
LONGMANS, GREEN, READER, AND DYER,  
PATERNOSTER ROW.

---

1881.



# MEDICO-CHIRURGICAL TRANSACTIONS.

PUBLISHED BY

THE ROYAL  
MEDICAL AND CHIRURGICAL SOCIETY  
OF  
LONDON.

SECOND SERIES.  
VOLUME THE FORTY-SIXTH.



LONDON:  
LONGMANS, GREEN, READER, AND DYER,  
PATERNOSTER ROW.

---

1881.

PRINTED BY  
J. E. ADLARD, BATHOLOMEW CLOSE.

ROYAL  
MEDICAL AND CHIRURGICAL SOCIETY  
OF LONDON.

---

PATRON.  
THE QUEEN.

---

OFFICERS AND COUNCIL,  
ELECTED MARCH 1, 1881.

---

*President.*

ANDREW WHYTE BARCLAY, M.D.

VICE-PRESIDENTS.	{	ALFRED BARING GARROD, M.D., F.R.S. SAMUEL OSBORNE HABERSHON, M.D. THOMAS SPENCER WELLS. TIMOTHY HOLMES.
TREASURERS.	{	CHARLES BLAND RADCLIFFE, M.D. JOHN COOPER FORSTER.
SECRETARIES.	{	REGINALD EDWARD THOMPSON, M.D. MATTHEW BERKELEY HILL.
LIBRARIANS.	{	EDWARD HENRY SIEVEKING, M.D. JOHN WHITAKER HULKE, F.R.S.
OTHER MEMBERS OF COUNCIL.	{	JAMES ANDREW, M.D. WILLIAM CHOLMELEY, M.D. CHARLES HILTON FAGGE, M.D. SYDNEY RINGER, M.D. REGINALD SOUTHEY, M.D. FREDERICK JAMES GANT. JOHN LANGTON. FRANCIS MASON. JOHN MORGAN. ALFRED WILLETT.

THE ABOVE FORM THE COUNCIL.

---

RESIDENT ASSISTANT-LIBRARIAN.  
BENJAMIN ROBERT WHEATLEY.



## A LIST OF THE PRESIDENTS OF THE SOCIETY FROM ITS FORMATION.

---

### ELECTED

- 1805. WILLIAM SAUNDERS, M.D.
- 1808. MATTHEW BAILLIE, M.D.
- 1810. SIR HENRY HALFORD, BART., M.D., G.C.H.
- 1813. SIR GILBERT BLANE, BART., M.D.
- 1815. HENRY CLINE.
- 1817. WILLIAM BABINGTON, M.D.
- 1819. SIR ASTLEY PASTON COOPER, BART., K.C.H., D.C.L.
- 1821. JOHN COOKE, M.D.
- 1823. JOHN ABERNETHY.
- 1825. GEORGE BIRKBECK, M.D.
- 1827. BENJAMIN TRAVERS.
- 1829. PETER MARK ROGET, M.D.
- 1831. SIR WILLIAM LAWRENCE, BART.
- 1833. JOHN ELLIOTSON, M.D.
- 1835. HENRY EARLE.
- 1837. RICHARD BRIGHT, M.D., D.C.L.
- 1839. SIR BENJAMIN COLLINS BRODIE, BART., D.C.L.
- 1841. ROBERT WILLIAMS, M.D.
- 1843. EDWARD STANLEY.
- 1845. WILLIAM FREDERICK CHAMBERS, M.D., K.C.H.
- 1847. JAMES MONCRIEFF ARNOTT.
- 1849. THOMAS ADDISON, M.D.
- 1851. JOSEPH HODGSON.
- 1853. JAMES COPLAND, M.D.
- 1855. CÆSAR HENRY HAWKINS.
- 1857. SIR CHARLES LOCOCK, BART., M.D.
- 1859. FREDERIC CARPENTER SKEY.
- 1861. BENJAMIN GUY BABINGTON, M.D.
- 1863. RICHARD PARTRIDGE.
- 1865. SIR JAMES ALDERSON, M.D., D.C.L.
- 1867. SAMUEL SOLLY.
- 1869. SIR GEORGE BURROWS, BART., M.D., D.C.L.
- 1871. THOMAS BLIZARD CURLING.
- 1873. CHARLES JAMES BLASIUS WILLIAMS, M.D.
- 1875. SIR JAMES PAGET, BART., D.C.L., LL.D.]
- 1877. CHARLES WEST, M.D.
- 1879. JOHN ERIC ERICHSEN.
- 1881. ANDREW WHYTE BARCLAY, M.D.

FELLOWS OF THE SOCIETY APPOINTED BY  
THE COUNCIL AS REFEREES OF PAPERS.

FOR THE SESSION OF 1881-82.

---

BARWELL, RICHARD.  
BAXTER, EVAN BUCHANAN, M.D.  
BROADBENT, WILLIAM HENRY, M.D.  
BRUNTON, THOMAS LAUDER, M.D., F.R.S.  
BURROWS, SIR GEORGE, BART., M.D., D.C.L., F.R.S.  
CHURCH, WILLIAM SELBY, M.D.  
CLARK, FREDERICK LE GROS, F.R.S.  
DUNCAN, JAS. MATTHEWS, M.D., LL.D., F.R.S. Ed.  
DURHAM, ARTHUR EDWARD.  
FAYRER, SIR JOSEPH, K.C.S.I., M.D., F.R.S.  
GREENFIELD, WILLIAM SMITH, M.D.  
HAWKINS, CÆSAR HENRY, F.R.S.  
HEWETT, PRESCOTT GARDNER, F.R.S.  
HEWITT, GRAILY, M.D.  
HUTCHINSON, JONATHAN.  
LANE, JAMES ROBERT.  
MARSHALL, JOHN, F.R.S.  
MOXON, WALTER, M.D.  
PAVY, FREDERICK WILLIAM, M.D., F.R.S.  
POLLOCK, GEORGE DAVID.  
POLLOCK, JAMES E., M.D.  
POWELL, RICHARD DOUGLAS, M.D.  
POWER, HENRY.  
PRIESTLEY, WILLIAM OVEREND, M.D.  
REES, GEORGE OWEN, M.D., F.R.S.  
SANDERSON, J. BURDON, M.D., F.R.S.  
SAVORY, WILLIAM SCOVELL, F.R.S.  
SIMON, JOHN, C.B., D.C.L., F.R.S.  
SMITH, THOMAS.  
STURGES, OCTAVIUS, M.D.  
TILT, EDWARD JOHN, M.D.  
WARING, EDWARD JOHN, M.D.  
WEBER, HERMANN, M.D.  
WILKS, SAMUEL, M.D., F.R.S.  
WILLIAMS, JOHN, M.D.  
WOOD, JOHN, F.R.S.

TRUSTEES OF THE SOCIETY.

SIR GEORGE BURROWS, BART., M.D., D.C.L., F.R.S.  
CÆSAR HENRY HAWKINS, F.R.S.  
THOMAS BLIZARD CURLING, F.R.S.

TRUSTEES OF THE MARSHALL HALL MEMORIAL FUND.

WALTER BUTLER CHEADLE, M.D.  
WILLIAM OGLE, M.D.  
THOMAS SMITH.

LIBRARY COMMITTEE FOR THE SESSION OF 1881-82.

J. WICKHAM LEGG, M.D.  
JOSEPH FRANK PAYNE, M.B.  
J. BURDON SANDERSON, M.D., F.R.S.  
JOHN WILLIAMS, M.D.  
C. THEODORE WILLIAMS, M.D.  
MARCUS BECK, M.S.  
EDWARD BELLAMY.  
J. WARRINGTON HAWARD.  
F. HOWARD MARSH.  
THOMAS P. PICK.

*Hon. Secs.* { REGINALD E. THOMPSON, M.D.  
                  { M. BERKELEY HILL.

*Hon. Libs.* { EDWARD HENRY SIEVEKING, M.D.  
                  { JOHN WHITAKER HULKE, F.R.S.

**FELLOWS**  
**OF THE**  
**ROYAL MEDICAL AND CHIRURGICAL SOCIETY**  
**OF LONDON.**

---

**EXPLANATION OF THE ABBREVIATIONS.**

P.—President.	V.P.—Vice-President.
T.—Treasurer.	S.—Secretary.
L.—Librarian.	C.—Member of Council.

The figures succeeding the words *Trans.* and *Pro.* show the number of Papers which have been contributed to the Transactions or Proceedings by the Fellow to whose name they are annexed. *Referee, Sci. Com., and Lib. Com.,* with the dates of office, are attached to the names of those who have served on the Committees of the Society.

---

**OCTOBER, 1881.**

Those marked thus (†) have paid the Composition Fee in lieu of further annual subscriptions.

Amongst the non-residents those marked thus (\*) are entitled by composition to receive the Transactions.

***Elected***

- 1846 \*ABERCROMBIE, JOHN, M.D., Physician to the Cheltenham General Hospital ; 13, Suffolk square, Cheltenham.
- 1877 ABERCROMBIE, JOHN, M.D., Hospital for Sick Children ; 49, Great Ormond street.
- 1851 \*ACLAND, HENRY WENTWORTH, M.D., F.R.S., Honorary Physician to H.R.H. the Prince of Wales ; Regius Professor of Medicine, and Clinical Professor in the University of Oxford.
- 1847 ACOSTA, ELISHA, M.D., 24, Rue de Luxembourg, St. Honoré, Paris.

*Elected*

- 1852 ADAMS, WILLIAM, Surgeon to the Great Northern Hospital and to the National Hospital for the Paralysed and Epileptic; Consulting Surgeon to the National Orthopædic Hospital, Great Portland street; 5, Henrietta street, Cavendish square. C. 1873-4. *Trans.* 3.
- 1867 AIKIN, CHARLES ARTHUR, 7, Clifton place, Hyde park.
- 1837 \*AINSWORTH, RALPH FAWSETT, M.D., Consulting Physician to the Manchester Royal Infirmary; Cliff Point, Lower Broughton, Manchester.
- 1839 ALCOCK, SIR RUTHERFORD, K.C.B., K.C.T., K.T.S., D.C.L., late H.M.'s Envoy Extraordinary at the Court of Pekin. *Trans.* 1.
- 1866 ALLBUTT, THOMAS CLIFFORD, M.A. and M.D., F.R.S., Lecturer on the Practice of Physic at the Leeds School of Medicine, and Physician to the Leeds General Infirmary; 35, Park square, Leeds. *Trans.* 3.
- 1879 ALLCHIN, WILLIAM HENRY, M.B., Physician to the Westminster Hospital; 5, Chandos street, Cavendish square, W.
- 1863 ALTHAUS, JULIUS, M.D., Senior Physician to the Hospital for Epilepsy and Paralysis, Regent's park; 36, Bryanston street, Portman square. *Trans.* 2.
- 1881 ANDERSON, JAMES, A.M., M.D., 37, Keppel street, Russell square.
- 1862 ANDREW, EDWYN, M.D., Hardwick House, St. John's Hill, Shrewsbury.
- 1862 ANDREW, JAMES, M.D., Physician to, and Lecturer on Medicine at, St. Bartholomew's Hospital; 22, Harley street, Cavendish square. S. 1878-9. C. 1881. *Trans.* 1.
- 1820 ANDREWS, THOMAS, M.D., Norfolk, Virginia.
- 1880 \*APPLETON, HENRY, M.D., Staines.
- 1878 ARNOLD, JOHN, Medical Officer of Health; Trinidad.
- 1819 †ARNOTT, JAMES MONCRIEFF, F.R.S., Chapel House, Lady Bank, Fifeshire, and 36, Sussex gardens, Hyde park. L. 1826-8. V.P. 1832-3. T. 1835-40. C. 1846, 1855-6. P. 1847-8. *Referee*, 1842-45, 1849-54, 1857-64. *Lib. Com.* 1836. *Trans.* 8.

*Elected*

- 1874 AVELING, JAMES H., M.D., Physician to the Chelsea Hospital for Women; 1, Upper Wimpole street, Cavendish square.
- 1836 BAIRD, ANDREW WOOD, M.D., Physician to the Dover Hospital; 7, Camden crescent, Dover, Kent.
- 1851 \*BAKER, ALFRED, Surgeon to the Birmingham General Hospital; 20A, Temple row, Birmingham.
- 1873 \*BAKER, J. WRIGHT, Senior Surgeon to the Derbyshire General Infirmary; 102, Friargate, Derby.
- 1865 BAKER, WILLIAM MORREANT, Assistant Surgeon to, and Lecturer on Physiology at, St. Bartholomew's Hospital; Surgeon to the Evelina Hospital for Sick Children; 26, Wimpole street, Cavendish square. C. 1878-9. *Lib. Com.* 1876-7. *Trans.* 6.
- 1869 BAKEWELL, ROBERT HALL, M.D., Ross, Westland, New Zealand.
- 1839 †BALFOUR, THOMAS GRAHAM, M.D., F.R.S., Surgeon General; Coombe Lodge, Wimbledon Park. C. 1852-3. V.P. 1860-1. T. 1872. *Lib. Com.* 1849. *Trans.* 2.
- 1848 †BALLARD, EDWARD, M.D., Inspector, Medical Department, Local Government Board; 12, Highbury terrace, Islington. C. 1872. V.P. 1875-6. *Referee*, 1853-71. *Lib. Com.* 1855. *Trans.* 5.
- 1866 \*BANKS, JOHN THOMAS, M.D., Physician in Ordinary to the Queen in Ireland; Physician to Richmond, Whitworth, and Hardwicke Hospitals; Consulting Physician to the Coombe Hospital; Member of the Senate of the Queen's University in Ireland; 11, Merrion square east, Dublin.
- 1847 †BARCLAY, ANDREW WHYTE, M.D., *President*, Physician to, and Lecturer on Medicine at, St. George's Hospital; Medical Officer of Health for Chelsea; 23A, Bruton street, Berkeley square. S. 1857-60. L. 1861-2. C. 1865-6. V.P. 1872-3. P. 1881. *Referee*, 1863-4, 1870-1, 1877-80. *Trans.* 2.

*Elected*

- 1879 BARKER, ARTHUR EDWARD JAMES, Assistant Surgeon to, and Assistant Professor of Clinical Surgery at, University College Hospital; 87, Harley street, Cavendish square. *Trans.* 2.
- 1833 †BARKER, THOMAS ALFRED, M.D., Consulting Physician to St. Thomas's Hospital; 27, Wimpole street. C. 1844-5. V.P. 1853-4. T. 1860-2. *Referee*, 1848-51. *Trans.* 6.
- 1876 BARLOW, THOMAS, M.D. and B.S. Lond., Assistant Physician to University College Hospital, and to the Hospital for Sick Children, Great Ormond Street; 10, Montague street, Russell square.
- 1881 \*BARNES, HENRY, M.D., 6, Portland square, Carlisle.
- 1861 BARNES, ROBERT, M.D., Obstetric Physician to, and Lecturer on Midwifery at, St. George's Hospital; 15, Harley street, Cavendish square. C. 1877-8. *Referee*, 1867-76. *Lib. Com.* 1869-73 *Trans.* 4.
- 1864 BARRATT, JOSEPH GILLMAN, M.D., 8, Cleveland gardens, Bayswater.
- 1880 BARROW, A. BOYCE, Pathological Registrar, King's College Hospital; 17, Welbeck street, Cavendish square, W.
- 1840 BARROW, BENJAMIN, Surgeon to the Royal Isle of Wight Infirmary; Southlands, Ryde, Isle of Wight.
- 1859 BARWELL, RICHARD, Surgeon to, and Lecturer on Surgery at, the Charing Cross Hospital; 32, George street, Hanover square. C. 1876-77. *Referee*, 1868-75, 1879-81. *Trans.* 8.
- 1868 BASTIAN, HENRY CHARLTON, M.A., M.D., F.R.S., Professor of Pathological Anatomy in University College, London, and Physician to University College Hospital; 20, Queen Anne street, Cavendish square. *Trans.* 1.
- 1874 BAXTER, EVAN BUCHANAN, M.D., Professor of *Materia Medica* at King's College, London; Assistant Physician to King's College Hospital; Examiner in *Materia Medica* at the University of London; 28, Weymouth street, Portland place. *Referee*, 1881.
- 1875 BEACH, FLETCHER, M.B., Medical Superintendent, Metropolitan District Asylum, Darenth, near Dartford, Kent.



*Elected*

- 1862 BEALE, LIONEL SMITH, M.B., F.R.S., Professor of the Principles and Practice of Medicine in King's College, London, and Physician to King's College Hospital; 61, Grosvenor street. C. 1876-77. *Referee*, 1873-5. *Trans.* 1.
- 1860 \*BEALEY, ADAM, M.D., M.A. Camb., Oak Lea, Harrogate.
- 1856 BEARDSLEY, AMOS, F.L.S., Bay villa, Grange-over-Sands, Lancashire.
- 1871 BECK, MARCUS, M.S., Teacher of Operative Surgery, and Assistant Professor of Clinical Surgery in University College; and Assistant Surgeon to University College Hospital; 30, Wimpole street, Cavendish square. *Lib. Com.* 1881.
- 1880 BEEVOE, CHARLES EDWARD, M.B., National Hospital for the Paralysed and the Epileptic; 23, Queen square, Bloomsbury.
- 1858 BEGLEY, WILLIAM CHAPMAN, A.M., M.D., late of the Middlesex County Lunatic Asylum, Hanwell; 26, Saint Peter's square, Hammersmith. C. 1877-8.
- 1871 BELLAMY, EDWARD, Surgeon to, and Lecturer on Anatomy at, Charing Cross Hospital; Professor of Anatomy in the Science and Art Department, South Kensington; 17, Wimpole street, Cavendish square. *Lib. Com.* 1879-81.
- 1847 BENNET, JAMES HENRY, M.D., The Ferns, Weybridge, and Mentone.
- 1880 BENNETT, ALEX. HUGHES, M.D., Assistant Physician to the Westminster Hospital; 1, Petersham terrace, Gloucester road.
- 1877 BENNETT, WILLIAM HENRY, Assistant Surgeon to St. George's Hospital; Surgeon to the Belgrave Hospital for Children; 5, Savile row, Burlington gardens.
- 1845 †BERRY, EDWARD UNWIN, 76, Gower street, Bedford square.
- 1820 BERTIN, STEPHEN, Paris.
- 1872 BEVERLEY, MICHAEL, M.D., Assistant Surgeon to the Norfolk and Norwich Hospital; 63, St. Giles's street, Norwich.

*Elected*

- 1865 \*BICKERSTETH, EDWARD ROBERT, Surgeon to the Liverpool Royal Infirmary, and Lecturer on Clinical Surgery in the Liverpool Royal Infirmary School of Medicine; 2, Rodney street, Liverpool. *Trans.* 1.
- 1873 BINDON, WILLIAM JOHN VEEKER, M.D., 2, Elm Villas, Kilburn.
- 1854 BIRD, PETER HINCKES, F.L.S., 1, Norfolk square, Sussex gardens, Hyde park.
- 1856 BIRD, WILLIAM, Consulting Surgeon to the West London Hospital; Bute House, Hammersmith.
- 1849 †BIRKETT, EDMUND LLOYD, M.D., Consulting Physician to the City of London Hospital for Diseases of the Chest; 48, Russell square. C. 1865-6. *Referee*, 1851-9.
- 1851 †BIRKETT, JOHN, F.L.S., Consulting Surgeon to Guy's Hospital; Corresponding Member of the "Société de Chirurgie" of Paris; Inspector of Anatomy for the Provinces in England and Wales; 59, Green street, Grosvenor square. L. 1856-7. S. 1863-5. C. 1867-8. T. 1870-78. V.P. 1879-80. *Referee*, 1851-5, 1866, 1869, *Sci. Com.* 1863. *Lib. Com.* 1852. *Trans.* 8.
- 1866 BISHOP, EDWARD, M.D., Cintra park, Upper Norwood.
- 1881 BISS, CECIL YATES, M.B., Assistant Physician to, and Lecturer on Botany at, the Middlesex Hospital; Assistant Physician to the Hospital for Consumption; 2, Old Burlington street, and Claremont, Sydenham park, S.E.
- 1865 BLANCHET, HILARION, Examiner to the College of Physicians and Surgeons, Lower Canada; 6, Palace street, Quebec, Canada east.
- 1865 BLANDFORD, GEORGE FIELDING, M.D., Lecturer on Psychological Medicine at St. George's Hospital; 71, Grosvenor street.
- 1867 BLOXAM, JOHN ASTLEY, Surgeon to, and Teacher of Operative Surgery in, Charing Cross Hospital; Surgeon for Out-Patients to the Lock Hospital; Junior Surgeon to the West London Hospital; 8, George street, Hanover square.
- 1823 BOJANUS, LOUIS HENRY, M.D., Wilna.

*Elected*

- 1846 †BOSTOCK, JOHN ASHTON, C.B., Hon. Surgeon to H.M. the Queen; Surgeon-Major, Scots Fusilier Guards; 73, Onslow gardens, Brompton. C.1861-2. V.P. 1870-71. *Sci. Com.* 1867.
- 1869 BOURNE, WALTER, M.D. [care of the National Bank of India, 80, King William street, City.]
- 1870 \*BOWLES, ROBERT LEAMON, M.D., 8, West terrace, Folkestone.
- 1841 †BOWMAN, WILLIAM, LL.D., F.R.S., F.L.S., Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 5, Clifford street, Bond street. C. 1852-3. V.P. 1862. *Referee*, 1845-50, 1854-6. *Lib. Com.* 1847. *Trans.* 3.
- 1862 BRACE, WILLIAM HENRY, M.D., 7, Queen's Gate terrace, Kensington.
- 1874 BRADSHAW, A. F., Surgeon-Major; Surgeon to the Rt. Hon. the Commander in Chief in India; Army Head Quarters, Bengal Presidency. [Agent: Vesey W. Holt, 17, Whitehall place.]
- 1867 \*BRETT, ALFRED T., M.D., Watford, Herts.
- 1876 BRIDGES, ROBERT, M.B., Assistant Physician to the Hospital for Sick Children; and Physician to the Great Northern Hospital; 52, Bedford square.
- 1867 BRIDGEWATER, THOMAS, M.B. Lond., Harrow-on-the-Hill, Middlesex.
- 1868 BROADBENT, WILLIAM HENRY, M.D., Physician to, and Lecturer on Medicine at, St. Mary's Hospital; Consulting Physician to the London Fever Hospital; 34, Seymour street, Portman square. *Referee*, 1881. *Trans.* 3.
- 1851 †BRODHURST, BERNARD EDWARD, F.L.S., Surgeon to the Royal Orthopædic Hospital; 20, Grosvenor street. C. 1868-9. *Lib. Com.* 1862-3. *Trans.* 2. *Pro.* 1.
- 1872 BRODIE, GEORGE BERNARD, M.D., Consulting Physician-Accoucheur to Queen Charlotte's Hospital; 8, Chesterfield street, Mayfair. *Trans.* 1.

*Elected*

- 1860 BROWN-SÉQUARD, CHARLES EDOUARD, M.D., LL.D., F.R.S., Laureate of the Academy of Sciences of Paris ; Professor of Medicine at the College of France ; Professor of General Physiology at the Museum of Natural History ; Paris. *Sci. Com.* 1862.
- 1878 BROWNE, JAMES CRICHTON, M.D., LL.D., F.R.S.Ed., Lord Chancellor's Visitor in Lunacy ; 7, Cumberland Terrace, Regent's Park.
- 1880 BROWNE, JAMES WILLIAM, M.B., 8, Norland place, Uxbridge road.
- 1874 BRUCE, JOHN MITCHELL, M.D., Assistant Physician to, and Lecturer on Materia Medica at, the Charing Cross Hospital ; Assistant Physician to the Hospital for Consumption, Brompton ; 70, Harley street. *Trans.* 1.
- 1871 BRUNTON, THOMAS LAUDER, M.D., F.R.S., Assistant Physician to, and Lecturer on Materia Medica at, St. Bartholomew's Hospital ; 50, Welbeck street, Cavendish square. *Referee*, 1880-81.
- 1860 BRYANT, THOMAS, Surgeon to, and Lecturer on Surgery at, Guy's Hospital ; 53, Upper Brook street, Grosvenor square. C. 1873-4. *Sci. Com.* 1863. *Lib. Com.* 1868-71. *Trans.* 8. *Pro.* 1.
- 1855 BRYANT, WALTER JOHN, M.R.C.P. Edinb. ; Physician to the Home for Incurable Children, Maida vale ; 23A, Sussex square, Hyde park gardens.
- 1823 BUCHANAN, B. BARTLET, M.D.
- 1864 BUCHANAN, GEORGE, M.D., Medical Officer of the Local Government Board ; 24, Nottingham place, Marylebone road.
- 1864 BUCKLE, FLEETWOOD, M.D.
- 1876 BUCKNILL, JOHN CHARLES, M.D., F.R.S. ; Hill Morton Hall, Rugby, and E 2, Albany, Piccadilly.
- 1839 BUDD, GEORGE, M.D., F.R.S., Consulting Physician to the Seamen's Hospital, Greenwich ; Ashleigh, Barnstaple. C. 1846-7. V.P. 1857. *Referee*, 1843-48, 1851, 1854-6. *Lib. Com.* 1839. *Trans.* 5.

*Elected*

- 1833 †BURROWS, SIR GEORGE, Bart., M.D., D.C.L., LL.D., F.R.S., Physician in Ordinary to H.M. the Queen; Consulting Physician to St. Bartholomew's Hospital; Member of the Senate of the University of London; 18, Cavendish square. C. 1839-40, 1858-9. T. 1845-7. V. P. 1849-50. P. 1869-70. *Referee*, 1842-6, 1850-7, 1861-68, 1875-81. *Lib. Com.* 1836. *Trans.* 2.
- 1837 †BUSK, GEORGE, F.R.S., F.L.S., Consulting Surgeon to the Seamen's Hospital, Greenwich; Member of the Senate of the University of London; 32, Harley street, Cavendish square. C. 1847-8. V.P. 1855. T. 1866. *Referee*, 1846-54, 1857-65. *Lib. Com.* 1847. *Trans.* 4.
- 1873 BUTLIN, HENRY TRENTHAM, Assistant Surgeon to, and Demonstrator of Practical Surgery at, St. Bartholomew's Hospital; Assistant Surgeon to the West London Hospital; 47, Queen Anne street, Cavendish square. *Trans.* 3.
- 1871 BUTT, WILLIAM F., 25, Park street, Park lane.
- 1868 BUZZARD, THOMAS, M.D., Physician to the National Hospital for the Paralysed and Epileptic; 56, Grosvenor street, Grosvenor square.
- 1851 \*CADGE, WILLIAM, Surgeon to the Norfolk and Norwich Hospital; 24, St. Giles's street, Norwich. *Trans.* 1.
- 1875 CARTER, CHARLES HENRY, M.D., Physician to the Hospital for Women, Soho square; 45, Great Cumberland place, Hyde park.
- 1853 CARTER, ROBERT BRUDENELL, Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. George's Hospital; 69, Wimpole street, Cavendish square. *Trans.* 1.
- 1845 †CARTWRIGHT, SAMUEL, late Professor of Dental Surgery at King's College, London, and Surgeon-Dentist to King's College Hospital; Consulting Surgeon to the Dental Hospital; 32, Old Burlington street. C. 1860-1. *Sci. Com.* 1863.

*Elected*

- 1879 CARTWRIGHT, S. HAMILTON, Professor of Dental Surgery at King's College; 32, Old Burlington street.
- 1868 CAVAFY, JOHN, M.D., Senior Assistant-Physician to St. George's Hospital; 2, Upper Berkeley street, Portman square. *Trans.* 1.
- 1871 CAYLEY, WILLIAM, M.D., Physician to, and Lecturer on the Principles and Practice of Medicine at, the Middlesex Hospital; Physician to the London Fever Hospital and to the North-Eastern Hospital for Children; 58, Welbeck street, Cavendish square.
- 1845 †CHALK, WILLIAM OLIVER, 3, Nottingham terrace, York gate, Regent's park. C. 1872-3.
- 1844 †CHAMBERS, THOMAS KING, M.D., Hon. Physician to H.R.H. the Prince of Wales; Consulting Physician to St. Mary's Hospital; Consulting Physician to the Lock Hospital; Shrubs Hill House, Sunningdale, Staines. C. 1861. V.P. 1867. L. 1869-72. *Referee*, 1851-60, 1866. *Lib. Com.* 1852, 1868. *Trans.* 1.
- 1879 CHAMPNEYS, FRANCIS HENRY, M.A., M.B., Assistant Obstetric Physician to St. George's Hospital; 11, Wyndham place, Bryanston square. *Trans.* 2.
- 1859 CHANCE, FRANK, M.D., Burleigh House, Sydenham Hill.
- 1849 CHAPMAN, FREDERICK, Old Friars, Richmond Green, Surrey.
- 1877 CHARLES, T. CRANSTOUN, M.D., Lecturer on Practical Physiology at St. Thomas's Hospital; 61, West Cromwell Road, South Kensington.
- 1881 \*CHAVASSE, THOMAS FREDERICK, M.D., C.M., Assistant Surgeon to the General Hospital, Birmingham; 108, New Hall street, Birmingham.
- 1868 CHEADLE, WALTER BUTLER, M.D., Physician (with charge of Out-patients) to, and Lecturer on Medicine at, St. Mary's Hospital; Physician to the Hospital for Sick Children; 2, Hyde park place, Cumberland gate.

*Elected*

- 1879 CHEYNE, WILLIAM WATSON, M.B., Assistant Surgeon and Demonstrator of Surgery to King's College Hospital; 6, Old Cavendish street.
- 1873 \*CHISHOLM, EDWIN, M.D., Abergeldie, Ashfield, near Sydney, New South Wales.
- 1865 CHOLMELEY, WILLIAM, M.D., Physician to the Great Northern Hospital, and to the Margaret Street Infirmary for Consumption; 63, Grosvenor street, Grosvenor square. C. 1881. *Referee*, 1873-80.
- 1872 CHRISTIE, THOMAS BEITH, M.D., Medical Superintendent, Royal India Asylum, Ealing.
- 1866 CHURCH, WILLIAM SELBY, M.D., Physician to, and Lecturer on Clinical Medicine at, St. Bartholomew's Hospital; 130, Harley street, Cavendish square. *Referee* 1874-81.
- 1860 CLARK, ANDREW, M.D., Physician to, and Lecturer on Medicine at, the London Hospital; 16, Cavendish square. C. 1875.
- 1879 CLARK, ANDREW, Assistant Surgeon to, and Lecturer on Practical Surgery at, the Middlesex Hospital; 19, Cavendish place, Cavendish square, W.
- 1839 †CLARK, FREDERICK LE GROS, F.R.S., Consulting Surgeon to St. Thomas's Hospital; The Thorns, Sevenoaks. S. 1847-9. V.P. 1855-6. *Referee*, 1859-81. *Lib. Com.* 1847. *Trans.* 5.
- 1848 †CLARKE, JOHN, M.D., 42, Hertford street, May Fair. C. 1866.
- 1866 CLARKE, WILLIAM FAIRLIE, M.D., M.A. Oxon., Southborough, Tunbridge Wells. *Trans.* 2.
- 1842 †CLAYTON, OSCAR MOORE PASSEY, Extra Surgeon-in-Ordinary to H.R.H. the Prince of Wales, and Surgeon-in-Ordinary to H.R.H. the Duke of Edinburgh; 5, Harley street, Cavendish square. C. 1865.
- 1853 CLOVER, JOSEPH THOMAS, 3, Cavendish place, Cavendish square. C. 1873. *Sci. Com.* 1863.



*Elected*

- 1879 CLUTTON, HENRY HUGH, M.A., M.B., Assistant Surgeon to St. Thomas's Hospital; 16, Palace road, Albert embankment.
- 1857 COATES, CHARLES, M.D., Physician to the Bath General and Royal United Hospitals; 10, Circus, Bath.
- 1868 COCKLE, JOHN, M.D., F.L.S., Physician to the Royal Free Hospital; 13, Spring gardens, Charing cross. *Trans.* 2.
- 1865 COOPER, ALFRED, Surgeon to the Lock Hospital; Assistant Surgeon to St. Mark's Hospital; Surgeon to the West London Hospital; 9, Henrietta street, Cavendish square.
- 1843 †COOPER, WILLIAM WHITE, Surgeon-Oculist in Ordinary to H.M. the Queen; Consulting Ophthalmic Surgeon to St. Mary's Hospital; 19, Berkeley square. C. 1858-9. V.P. 1873-4. *Lib. Com.* 1847, 1856-7.
- 1868 CORNISH, WILLIAM ROBERT, Surgeon-Major, Madras Army; Sanitary Commissioner for Madras; Secretary to the Inspector-General, Indian Medical Department.
- 1860 \*CORY, THOMAS CHARLES STEUART, M.D., Surgeon to the Belfast General Dispensary; 146, Donegall Pass, Belfast.
- 1853 CORY, WILLIAM GILLETT, M.D., 1, Caledonia place, Clifton, Bristol.
- 1864 COULSON, WALTER JOHN, Surgeon to the Lock Hospital, 17, Harley street, Cavendish square.
- 1860 †COUPER, JOHN, Surgeon to the London Hospital; Assistant Surgeon to the Royal London Ophthalmic Hospital; 80, Grosvenor street. C. 1876.
- 1877 COUPLAND, SIDNEY, M.D., Physician to, and Lecturer on Pathological Anatomy at, the Middlesex Hospital; 14, Weymouth street, Portland place.
- 1862 COWELL, GEORGE, Surgeon to, and Lecturer on Surgery at, the Westminster Hospital; Surgeon to the Royal Westminster Ophthalmic Hospital; Surgeon to the Victoria Hospital for Children; 19, George street, Hanover square.

*Elected*

- 1841 CRAWFORD, MERVYN ARCHDALL NOTT, M.D., Millwood, Wilbury road, Brighton. C. 1853-4.
- 1868 CRAWFORD, THOMAS, M.D., Deputy Inspector-General of Hospitals (India); Umbalah, Punjaub.
- 1873 CREIGHTON, CHARLES, M.D., 25, Savile row.
- 1869 \*CRESSWELL, PEARSON R., Dowlais, Merthyr Tydvil.
- 1874 CRIPPS, WILLIAM HARRISON, Surgical Registrar to St. Bartholomew's Hospital; Surgeon to the Great Northern Hospital; Assistant Surgeon to the Royal Free Hospital; 6, Stratford place, Oxford street. *Trans.* 1.
- 1847 †CRITCHETT, GEORGE, Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 21, Harley street, Cavendish square. C. 1865. V.P. 1872. *Referee*, 1867-71. *Trans.* 1.
- 1868 CROFT, JOHN, Surgeon to, and Lecturer on Clinical Surgery at, St. Thomas's Hospital; 61, Brook street, Grosvenor square. *Lib. Com.* 1877-8. *Trans.* 1.
- 1862 CROMPTON, SAMUEL, M.D., late Physician to the Salford Royal Hospital and Dispensary; Brookmead, Cranleigh, Surrey.
- 1837 CROOKES, JOHN FARRAR, Grimethorpe, Tunbridge Wells.
- 1860 CROSS, RICHARD, M.D., Carlton House, Belmont road, Scarborough.
- 1872 CROSSE, THOMAS WILLIAM, Surgeon to the Norfolk and Norwich Hospital; 22, St. Giles's street, Norwich.
- 1849 \*CROWFOOT, WILLIAM EDWARD, Beccles, Suffolk.
- 1879 CUMBERBATCH, A. ELKIN, Demonstrator of Anatomy at St. Bartholomew's Hospital; 17, Queen Anne street.
- 1846 CURLING, HENRY, Consulting Surgeon to the Margate Royal Sea-Bathing Infirmary, and the Ramsgate Seamen's Infirmary; Ramsgate, Kent.
- 1837 †CURLING, THOMAS BLIZARD, F.R.S., Consulting-Surgeon to the London Hospital; 27, Brunswick square, Brighton. S. 1845-6. C. 1850. T. 1854-7. V.P. 1859. P. 1871-2. *Referee*, 1844-6, 1851-3, 1858, 1865-70, 1875-9. *Sci. Com.* 1863. *Lib. Com.* 1839. *Trans.* 13. *Pro.* 1.

*Elected*

- 1873 CURNOW, JOHN, M.D., Professor of Anatomy at King's College, London, and Assistant Physician to King's College Hospital; 3, George street, Hanover square.
- 1847 CUREY, JOHN EDMUND, M.D., Lismore, County Waterford.
- 1822 CUSACK, CHRISTOPHER JOHN, Chateau d'Eu, France.
- 1872 DALBY, WILLIAM BARTLETT, M.B., Lecturer on Aural Surgery at St. George's Hospital; 18, Savile row. *Trans.* 2.
- 1836 \*DANIEL, JAMES STOCK, Ramsgate, Kent.
- 1877 DARBISHIRE, SAMUEL DUKINFIELD, M.B., Physician to the Radcliffe Infirmary, Oxford.
- 1879 DARWIN, FRANCIS, M.B., Down, Kent.
- 1848 DAUBENY, HENRY, M.D., San Remo, Italy.
- 1874 DAVIDSON, ALEXANDER, M.D., Physician to the Liverpool Northern Hospital; 49, Rodney street, Liverpool.
- 1853 DAVIES, ROBERT COKER NASH, Rye, Sussex.
- 1852 DAVIES, WILLIAM, M.D., 18, Gay street, Bath.
- 1876 DAVIES-COLLEY, J. NEVILLE C., M.C., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital; 36, Harley street, Cavendish square. *Trans.* 1.
- 1878 DAVY, RICHARD, Surgeon to, and Lecturer on Surgery at, the Westminster Hospital; 33, Welbeck street, Cavendish square.
- 1867 DAY, WILLIAM HENRY, M.D., Physician to the Samaritan Free Hospital for Women and Children; 10, Manchester square.
- 1878 DENT, CLINTON THOMAS, Assistant Surgeon to St. George's Hospital; 29, Chesham Street, Belgrave square. *Trans.* 2.
- 1846 \*DENTON, SAMUEL BEST, M.D., Ivy Lodge, Hornsea, Hull.
- 1859 †DICKINSON, WILLIAM HOWSHIP, M.D., Physician to, and Lecturer on Medicine at St. George's Hospital, and Senior Physician to the Hospital for Sick Children, Examiner in Medicine at the University of London; 9, Chesterfield street, Mayfair. C. 1874-5. *Referee*, 1869-73. *Sci. Com.* 1867-79 *Trans.* 13.

*Elected*

- 1839 †DIXON, JAMES, Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Consulting Ophthalmic Surgeon to the Asylum for Idiots; Harrow Lands, Dorking. L. 1849-55. V.P. 1857-8. T. 1863-4. C. 1866-7. *Referee*, 1865. *Lib. Com.* 1845-8. *Trans.* 4.
- 1862 DOBELL, HORACE B., M.D., Consulting Physician to the Royal Hospital for Diseases of the Chest, City road; 84, Harley street. *Trans.* 2.
- 1845 DODD, JOHN.
- 1879 DONKIN, HORATIO, M.B., 60, Upper Berkeley street, Portman square.
- 1877 DORAN, ALBAN HENRY GRIFFITHS, Surgeon to Out-Patients, Samaritan Hospital; Pathological Assistant to the Museum of the Royal College of Surgeons of England; 51, Seymour street, Portman square.
- 1863 DOWN, JOHN LANGDON HAYDON, M.D., Physician to, and Lecturer on Clinical Medicine at, the London Hospital; 81, Harley street, Cavendish square. C. 1880. *Trans.* 2.
- 1867 DRAGE, CHARLES, M.D., Hatfield, Herts.
- 1879 DREWITT, F. G. DAWTREY, M.B. Ox., Savile Club, 15, Savile Row.]
- 1853 DRUITT, ROBERT, F.R.C.P. [8, Strathmore gardens, Kensington Mall.] *Trans.* 2.
- 1880 DRURY, CHARLES DENNIS HILL, M.D., Bondgate, Darlington.
- 1865 DRYSDALE, CHARLES ROBERT, M.D., Physician to the Farringdon Dispensary; Assistant-Physician to the Metropolitan Free Hospital; 17, Woburn place, Russell square.
- 1865 DUCKWORTH, DYCE, M.D., Assistant-Physician to, and Lecturer on Skin Diseases at, St. Bartholomew's Hospital; 11, Grafton street, Bond street. *Trans.* 1.
- 1876 DUDLEY, WILLIAM LEWIS, M.D., Physician to the City Dispensary; 125, Cromwell road, South Kensington.

*Elected*

- 1845 DUFF, GEORGE, M.D., High street, Elgin.
- 1874 DUFFIN, ALFRED BAYNARD, M.D., Professor of Pathological Anatomy in King's College, London, and Physician to King's College Hospital; 18, Devonshire street, Portland place.
- 1874 DUKA, THEODORE, M.D., [Surgeon-Major, H.M.'s Bengal Army]; 38, Montagu square.
- 1871 DUKE, BENJAMIN, 1, Cavendish terrace, Clapham Common.
- 1871 \*DUKES, CLEMENT, M.D. and B.S., Horton crescent, Rugby, Warwickshire.
- 1867 DUKES, M. CHARLES, M.D., Wellesley Villa, Wellesley road, Croydon.
- 1880 DUNBAR, JAMES JOHN MACWHIRTER, M.B., Argyle House, Clapham Common.
- 1877 DUNCAN, JAMES MATTHEWS, M.D., LL.D. Ed., F.R.S. Ed., Obstetric Physician to, and Lecturer on Midwifery and Diseases of Women at, St. Bartholomew's Hospital; Examiner in Obstetric Medicine, University of London; 71, Brook street, Grosvenor square. *Referee*, 1881.
- 1863 DURHAM, ARTHUR EDWARD, F.L.S., Surgeon to, and Lecturer on Surgery at, Guy's Hospital; 82, Brook street, Grosvenor square. C. 1876-7. *Referee*, 1880-1. *Sci. Com.* 1867. *Lib. Com.* 1872-5. *Trans.* 5.
- 1874 DURHAM, FREDERIC, M.B., Surgical Registrar to Guy's Hospital; 38, Brook street, Grosvenor square.
- 1843 DURRANT, CHRISTOPHER MERCER, M.D., Physician to the East Suffolk and Ipswich Hospital; Ipswich, Suffolk.
- 1872 EAGER, REGINALD, M.D., Northwoods, near Bristol.
- 1836 EARLE, JAMES WILLIAM, late of Norwich.
- 1868 EASTES, GEORGE, M.B. Lond., Surgeon-Accoucheur to the Western General Dispensary; 69, Connaught street, Hyde park square.
- 1824 EDWARDS, GEORGE.
- 1823 EGERTON, CHARLES CHANDLER, Kendall Lodge, Epping.
- 1869 ELAM, CHARLES, M.D., Assistant-Physician to the National Hospital for the Paralysed and Epileptic; 75, Harley street, Cavendish square.

*Elected*

- 1861 \*ELLIOT, ROBERT, M.D., Physician to the Fever Hospital and to the Dispensary, Carlisle; Coroner for Carlisle; 35, Lowther street, Carlisle.
- 1848 ELLIS, GEORGE VINER, late Professor of Anatomy in University College, London; Minsterworth, Gloucester. C. 1863-4. *Trans.* 2.
- 1868 ELLIS, JAMES, M.D., the Sanatorium, Anaheim, Los Angeles County, California.
- 1854 \*ELLISON, JAMES, M.D., Surgeon-in-Ordinary to the Royal Household, Windsor; 14, High street, Windsor.
- 1842 †ERICHSEN, JOHN ERIC, F.R.S., Surgeon Extraordinary to H.M. the Queen; Emeritus Professor of Clinical Surgery in University College, London, and Consulting Surgeon to University College Hospital; 6, Cavendish place, Cavendish sq. C. 1855-6. V.P. 1868. P. 1879-80. *Referee*, 1866-7. *Lib. Com.* 1844-7, 1854. *Trans.* 2.
- 1874 EVANS, GEORGE HENRY, M.D.
- 1879 EVE, FREDERIC S., Curator of the Museum, St. Bartholomew's Hospital; 14, Furnival's Inn, Holborn. *Trans.* 2.
- 1877 EWART, WILLIAM, M.B., Assistant Physician to the Hospital for Consumption, Brompton; Lecturer on Physiological Chemistry at St. George's Hospital; 33, Curzon street, Mayfair.
- 1875 \*FAGAN, JOHN, Surgeon to the Belfast Hospital for Sick Children; 11, College square north, Belfast.
- 1864 †FAGGE, CHARLES HILTON, M.D., Physician to, and Lecturer on Pathology at, Guy's Hospital; Examiner in Medicine at the University of London; 11, St. Thomas's street, Southwark. C. 1880-81. *Referee*, 1874-9. *Sci. Com.* 1879. *Lib. Com.* 1875-9. *Trans.* 7.
- 1869 FAIRBANK, FREDERICK ROYSTON, M.D., 46, Hallgate, Doncaster.
- 1862 FARQUHARSON, ROBERT, M.D., M.P., Migvie Lodge, Porchester gardens, Hyde park. *Lib. Com.* 1876-80.

*Elected*

- 1844 †FARRE, ARTHUR, M.D., F.R.S., Physician Extraordinary to H.M. the Queen ; Physician-Accoucheur to H.R.H. the Princess of Wales ; 18, Albert Mansions, Victoria street, Westminster. C. 1857. V.P. 1864. *Referee*, 1848-54, 1861-3, 1865-6. *Sci. Com.* 1863. *Lib. Com.* 1847.
- 1872 FAYRER, SIR JOSEPH, K.C.S.I., M.D., F.R.S., Honorary Physician to H.M. the Queen, and to H.R.H. the Prince of Wales, and Physician to H.R.H. the Duke of Edinburgh ; Surgeon-General, late Bengal Medical Service ; Examining Medical Officer to the Secretary of State for India in Council ; President of the Indian Medical Board ; 53, Wimpole street, Cavendish square. *Referee*, 1881.
- 1872 \*FENWICK, JOHN C. J., M.D., Physician to the Durham County Hospital ; 16, Old Elvet, Durham.
- 1863 FENWICK, SAMUEL, M.D., Physician to the London Hospital ; 29, Harley street, Cavendish square. C. 1880. *Trans.* 3.
- 1880 FERRIER, DAVID, M.D., F.R.S., Professor of Forensic Medicine at King's College, London, and Physician to King's College Hospital ; Physician for Out-patients to the National Hospital for the Paralysed and Epileptic ; Examiner in Forensic Medicine at the University of London ; 16, Upper Berkeley street, Portman square, W.
- 1852 \*FIELD, ALFRED GEORGE.
- 1849 †FINCHAM, GEORGE TUPMAN, M.D., Physician to, and Joint Lecturer on Medicine at, the Westminster Hospital ; 13, Belgrave road, Pimlico. C. 1871.
- 1879 FINLAY, DAVID WHITE, M.D., Assistant Physician to, and Lecturer on Forensic Medicine at, the Middlesex Hospital ; Physician to the Royal Hospital for Diseases of the Chest ; 21, Montagu street, Portman square.
- 1866 FISH, JOHN CROCKETT, B.A., M.D. Camb., Assistant Physician to the West London Hospital ; 92, Wimpole street, Cavendish square.
- 1866 FITZPATRICK, THOMAS, M.D., M.A., Dublin ; Physician to the Western General Dispensary ; 30, Sussex gardens, Hyde park.

*Elected*

- 1842 FLETCHER, THOMAS BELL ELCOCK, M.D., Consulting Physician to the Birmingham General Hospital; 43, Clarendon square, Leamington. *Trans.* 1.
- 1864 \*FOLKER, WILLIAM HENRY, Surgeon to the North Staffordshire Infirmary; Bedford House, Hanley, Staffordshire.
- 1877 FONMARTIN, HENRY DE, M.D., Knaphill, Woking, Surrey.
- 1848 †FORBES, JOHN GREGORY, Egerton House, Egerton, Ashford, Kent. C. 1868-9. *Lib. Com.* 1855. *Trans.* 2.
- 1852 †FORSTER, JOHN COOPER, *Treasurer*, Consulting Surgeon to the Royal Hospital for Children and Women; 29, Upper Grosvenor street. C. 1868-9. S. 1873-5. V.P. 1877-8. T. 1879-81. *Referee*, 1870-2, 1876. *Pro.* 1.
- 1877 \*FORTESCUE, GEORGE, M.B., late Surgeon to the Sydney Infirmary; 6, Lyons terrace, Sydney, New South Wales.
- 1865 FOSTER, BALTHAZAR WALTER, M.D., Professor of Medicine at the Queen's College, Birmingham, and Physician to the Birmingham General Hospital; 16, Temple row, Birmingham.
- 1859 FOX, EDWARD LONG, M.D., Consulting Physician to the Bristol Royal Infirmary, and Lecturer on Medicine at the Bristol School of Medicine; Church House, Clifton, Gloucestershire.
- 1880 FOX, THOMAS COLCOTT, B.A., M.B., Physician to the St. George's and St. James's Dispensary; 14, Harley street, Cavendish square.
- 1858 FOX, WILSON, M.D., F.R.S., Physician-Extraordinary to H.M. the Queen; Physician in Ordinary to H.R.H. the Duke of Edinburgh; Holme Professor of Clinical Medicine in University College, London, and Physician to University College Hospital; 67, Grosvenor street. C. 1875-6. *Referee*, 1869-74. *Lib. Com.* 1866-70, 1874. *Trans.* 3.
- 1871 FRANK, PHILIP, M.D., Cannes, France.
- 1843 FRASER, PATRICK, M.D. C. 1866.
- 1868 FREEMAN, WILLIAM HENRY, 21, St. George's square, South Belgravia.
- 1836 †FRENCH, JOHN GEORGE, 10, Cunningham place, Maida hill. C. 1852-3.
- 1876 FURNER, WILLOUGHBY, 111, King's road, Brighton.



*Elected*

- 1864 \*GAIRDNER, WILLIAM TENNANT, M.D., Physician in Ordinary to H.M. the Queen in Scotland; Professor of the Practice of Medicine in the University of Glasgow; Physician to the Glasgow Royal Infirmary; 225, St. Vincent street, Glasgow.
- 1874 GALABIN, ALFRED LEWIS, M.A., M.D., Assistant Obstetric Physician to, and Lecturer on Midwifery and the Diseases of Women at, Guy's Hospital; Assistant-Physician to the Hospital for Sick Children; 14, St. Thomas's street, Southwark. *Trans.* 2.
- 1865 GANT, FREDERICK JAMES, Senior Surgeon to the Royal Free Hospital; 16, Connaught square, Hyde park. C. 1880-81. *Trans.* 3.
- 1867 GARLAND, EDWARD CHARLES, L.R.C.P. Edin., Yeovil, Somerset.
- 1867 GARLIKE, THOMAS W., Malvern Villa, Churchfield road, Ealing.
- 1854 GARROD, ALFRED BARING, M.D., F.R.S., *Vice-President*, Consulting Physician to King's College Hospital; 10, Harley street, Cavendish square. C. 1867. V.P. 1880-81. *Referee*, 1855-65. *Trans.* 8.
- 1879 GARSTANG, THOMAS WALTER HARROPP, Oakleigh, Dobcross, near Manchester.
- 1851 †GASKOIN, GEORGE, Surgeon to the British Hospital for Diseases of the Skin; 7, Westbourne park. C. 1875-6. *Trans.* 2.
- 1819 GAULTER, HENRY.
- 1848 †GAY, JOHN, Senior Surgeon to the Great Northern Hospital, and Consulting Surgeon to the Asylum for Idiots; 34, Finsbury place. C. 1874-5.
- 1866 GEE, SAMUEL JONES, M.D., Physician to, and Lecturer on Medicine at, St. Bartholomew's Hospital; Physician to the Hospital for Sick Children; 54, Wimpole street, Cavendish square. *Sci. Com.* 1879. *Lib. Com.* 1871-6. *Trans.* 1.

*Elected*

- 1878 GERVIS, HENRY, M.D., Obstetric Physician to, and Lecturer on Obstetric Medicine at, St. Thomas's Hospital; Examiner in Obstetric Medicine at the University of London; 40, Harley street, Cavendish square.
- 1880 GIBBONS, ROBERT ALEXANDER, M.D., Physician to the Infirmary for Consumption, Margaret street; 88, Cadogan place.
- 1877 GODLEE, RICKMAN JOHN, Assistant-Surgeon to University College Hospital; and Demonstrator of Anatomy in University College; 81, Wimpole street, Cavendish square.
- 1870 GODSON, CLEMENT, M.D., Assistant-Physician-Accoucheur to St. Bartholomew's Hospital; 9, Grosvenor street, Grosvenor square.
- 1851 GOODFELLOW, STEPHEN JENNINGS, M.D., Consulting Physician to the Middlesex Hospital; Swinnerton Lodge, near Dartmouth, Devon. C. 1864-5. *Referee*, 1860-3. *Lib. Com.* 1863. *Trans.* 2.
- 1877 GOULD, ALFRED PEARCE, M.S., Assistant Surgeon to, and Lecturer on Anatomy at, the Westminster Hospital; 16, Queen Anne street, Cavendish square.
- 1873 GOWERS, WILLIAM RICHARD, M.D., Assistant Professor of Clinical Medicine in University College, and Assistant-Physician to University College Hospital; 50, Queen Anne street, Cavendish square. *Trans.* 6.
- 1851 GOWLLAND, PETER YEAMES, Surgeon to St. Mark's Hospital; Surgeon-Major Hon. Artillery Company; 34, Finsbury square.
- 1846 GREAM, GEORGE THOMPSON, M.D., Physician-Accoucheur to H.R.H. the Princess of Wales; Crawleydown park, Worth, Sussex. C. 1863.
- 1868 GREEN, T. HENRY, M.D., Physician to, and Lecturer on Pathology at, Charing Cross Hospital; Assistant-Physician to the Hospital for Consumption, Brompton; 74, Wimpole street, Cavendish square.
- 1875 GREENFIELD, WILLIAM SMITH, M.D., Professor of General Pathology in the University of Edinburgh; 7, Heriot row, Edinburgh. *Sci. Com.* 1879. *Referee*, 1881.

*Elected*

- 1843 †GREENHALGH, ROBERT, M.D., Consulting Physician to the Samaritan Free Hospital for Women and Children, and to the City of London Lying-in Hospital [9, Grosvenor street]. C. 1871-2. *Referee*, 1876-7. *Trans.* 1.
- 1860 GREENHOW, EDWARD HEADLAM, M.D., F.R.S., Consulting Physician to the Middlesex Hospital; and Consulting Physician to the Western General Dispensary; Castle Lodge, Reigate. C. 1876-7. *Referee*, 1870-5. *Trans.* 3.
- 1868 GRIGG, WILLIAM CHAPMAN, M.D., Assistant Obstetric Physician to the Westminster Hospital; Physician to the In-Patients, Queen Charlotte's Lying-in-Hospital; Assistant-Physician to the Victoria Hospital for Children; 6, Curzon street, Mayfair.
- 1852 GROVE, JOHN, Westgate court, Canterbury.
- 1860 GUENEAU DE MUSSY, HENRI, M.D.; 15, Rue du Cirque, Paris. *Lib. Com.* 1863-5.
- 1849 †GULL, SIR WILLIAM WITHEY, Bart., M.D., D.C.L., LL.D., F.R.S., Physician-Extraordinary to the Queen; Member of the Senate of the University of London; Consulting Physician to Guy's Hospital; 74, Brook street, Grosvenor square. C. 1864. V.P. 1874. *Referee*, 1855-63. *Trans.* 4.
- 1837 GULLY, JAMES MANBY, M.D.
- 1854 HABERSHON, SAMUEL OSBORNE, M.D., *Vice-President*, 70, Brook street, Grosvenor square. S. 1867. C. 1869-70. V.P. 1881. *Referee*, 1862-6, 1868, 1871-80. *Trans.* 3.
- 1881 HALL, FRANCIS DE HAVILLAND, M.D., Assistant Physician, and Physician to the Throat Department, Westminster Hospital; Physician to St. Mark's Hospital; 46, Queen Anne street, Cavendish square.
- 1870 HAMILTON, ROBERT, Surgeon to the South Hospital, Liverpool; 1 Prince's road, Liverpool.
- 1874 HARDIE, GORDON KENMURE, M.D., Deputy Inspector General of Hospitals; Florence road, Ealing, and Duff House, Banff, N.B.
- 1836 HARDING, JOHN FOSSE, Eagle House, Hornsey. C. 1858-9.

*Elected*

- 1856 HARE, CHARLES JOHN, M.D., late Professor of Clinical Medicine in University College, London, and late Physician to University College Hospital; 57, Brook street, Grosvenor square. C. 1873-4.
- 1857 HARLEY, GEORGE, M.D., F.R.S. 25, Harley street, Cavendish square. C. 1871-2. *Referee*, 1865-70, 1873-6. *Sci. Com.* 1862-3. *Trans.* 1.
- 1864 HARLEY, JOHN, M.D., F.L.S., Physician to, and Lecturer on Clinical Medicine at, St. Thomas's Hospital; 39, Brook street, Grosvenor square. S. 1875-7. C. 1879-80. *Referee*, 1871-4. *Sci. Com.* 1879. *Trans.* 8.
- 1866 HARPER, PHILIP H., 30, Cambridge street, Hyde park.
- 1859 HARRIS, FRANCIS, M.D., F.L.S., 24, Cavendish square.
- 1880 HARRIS, VINCENT DORMER, M.D., Casualty Physician to St. Bartholomew's Hospital, and Assistant Physician to the Victoria Park Hospital; 39, Wimpole street, Cavendish square.
- 1872 HARRIS, WILLIAM H., M.D., Professor of Midwifery and Diseases of Women and Children, Madras Medical College, Madras.
- 1870 HARRISON, REGINALD, Surgeon to the Liverpool Royal Infirmary, and Lecturer on Surgery at the School of Medicine; 38, Rodney street, Liverpool.
- 1854 HAVILAND, ALFRED, Medical Officer of Health for the combined Districts of Northamptonshire; Northampton.
- 1870 HAWARD, J. WARRINGTON, Surgeon to St. George's Hospital; Surgeon to the Hospital for Sick Children; 16, Savile row, Burlington gardens. *Lib. Com.* 1881. *Trans.* 1.
- 1828 †HAWKINS, CÆSAR HENRY, F.R.S., Sergeant-Surgeon to H.M. the Queen, and Consulting Surgeon to St. George's Hospital; 26, Grosvenor street. C. 1830-1, 1860. V.P. 1838-9. T. 1841-4. P. 1855-6. *Referee*, 1843-7, 1850-4, 1857-9, 1861-81. *Trans.* 12.
- 1838 †HAWKINS, CHARLES, Inspector of Anatomical Schools in London; 27, Savile row, Burlington gardens. C. 1846-7. S. 1850. V.P. 1858. T, 1861-2. *Referee*, 1859-60. *Lib. Com.* 1843. *Trans.* 2.

*Elected*

- 1848 †HAWKSLEY, THOMAS, M.D., Consulting Physician to the Margaret street Dispensary for Consumption and Diseases of the Chest ; 31, Grosvenor street.
- 1875 HAYES, THOMAS CRAWFORD, M.D., Assistant-Physician-Accoucheur and Assistant-Physician for Diseases of Women and Children to King's College Hospital ; 17, Clarges street, Piccadilly.
- 1860 HAYWARD, HENRY HOWARD, Surgeon Dentist to, and Lecturer on Dental Surgery at, St. Mary's Hospital ; 38, Harley street, Cavendish square. C. 1878-9.
- 1861 HAYWARD, WILLIAM HENRY, Church House, Oldbury, Worcestershire.
- 1848 \*HEALE, JAMES NEWTON, M.D., care of the Secretary of the Winchester Hospital, Winchester, Hants.
- 1865 HEATH, CHRISTOPHER, Holme Professor of Clinical Surgery in University College, London ; and Surgeon to University College Hospital ; 36, Cavendish square. C. 1880. *Lib. Com.* 1870-3. *Trans.* 2.
- 1850 HEATON, GEORGE, M.D., Boston, U.S.
- 1821 HERBERSKI, VINCENT, M.D., Professor of Medicine in the University of Wilna.
- 1877 HERMAN, GEORGE ERNEST, M.D., Assistant Obstetric Physician to the London Hospital ; 7, West street, Finsbury circus.
- 1877 HERON, GEORGE ALLAN, M.D., Assistant Physician to the City of London Hospital for Diseases of the Chest, Victoria Park ; Assistant Physician to the West London Hospital for the Paralysed and Epileptic ; 40, Margaret street, Cavendish square.
- 1843 HEWETT, PRESCOTT GARDNER, F.R.S., Serjeant-Surgeon-Extraordinary to H.M. the Queen ; Surgeon in Ordinary to H.R.H. the Prince of Wales ; Consulting Surgeon to St. George's Hospital ; Corresponding Member of the Academy of Medicine, and of the "Société de Chirurgie," Paris ; 1, Chesterfield street, Mayfair. C. 1859. V.P. 1866-7. *Referee*, 1850-8, 1860-5, 1868-81. *Sci. Com.* 1863. *Lib. Com.* 1846-7. *Trans.* 7.

*Elected*

- 1855 HEWITT, GRAILY, M.D., Professor of Midwifery in University College, London, and Obstetric Physician to University College Hospital; 36, Berkeley square. C. 1876. *Referee*, 1868-75, 1877-81. *Lib. Com.* 1868, 1874.
- 1880 HICKS, CHARLES CYRIL, M.D., 41, Cromwell Houses, S.W.
- 1873 HIGGENS, CHARLES, Assistant Ophthalmic Surgeon to Guy's Hospital; 38, Brook street, Grosvenor square. *Trans.* 2.
- 1862 HILL, M. BERKELEY, M.B. Lond., *Secretary*, Professor of Clinical Surgery in University College, London, and Surgeon to University College Hospital; Surgeon to the Lock Hospital; 55, Wimpole street, Cavendish square. C. 1878-9. S. 1881.
- 1867 HILL, SAMUEL, M.D., 22, Mecklenburgh square.
- 1859 HIRD, FRANCIS, Consulting Surgeon to the Charing Cross Hospital; 13, Old Burlington street.
- 1861 \*HOFFMEISTER, WILLIAM CARTER, M.D., Surgeon to H.M. the Queen in the Isle of Wight; Clifton House, Cowes, Isle of Wight.
- 1872 HOGG, FRANCIS ROBERTS, M.D., Army Medical School, Netley, Southampton.
- 1843 †HOLDEN, LUTHER, Consulting Surgeon to St. Bartholomew's Hospital; Consulting Surgeon to the Metropolitan Dispensary; Surgeon to the Foundling Hospital; Pinetoft, Ipswich. C. 1859. L. 1865. V.P. 1874. *Referee*, 1866-7. *Lib. Com.* 1858.
- 1879 HOLLAND, PHILIP ALEXANDER, M.A., Swancoe Park, Macclesfield.
- 1868 HOLLIS, WILLIAM AINSLIE, M.A., M.B., Camb., Assistant-Physician to the Sussex County Hospital; Park Gate, Preston road, Brighton.
- 1861 HOLMAN, WILLIAM HENRY, M.B. Lond., 68, Adelaide road, South Hampstead.

*Elected*

- 1856 HOLMES, TIMOTHY, M.A. Camb., *Vice-President*, Surgeon to, and Lecturer on Surgery at, St. George's Hospital; Surgeon in Chief to the Metropolitan Police Force; 18, Great Cumberland place, Hyde park. C. 1869-70. L. 1873-7. S. 1878-80. V.P. 1881. *Referee*, 1866-8, 1872. *Sci. Com.* 1867. *Lib. Com.* 1863-5. *Trans.* 6.
- 1846 †HOLT, BARNARD WIGHT, Consulting Surgeon to, and Lecturer on Clinical Surgery at, the Westminster Hospital; Medical Officer of Health for Westminster; 14, Savile row, Burlington gardens. C. 1862-3. V.P. 1879-80.
- 1846 †HOLTHOUSE, CARSTEN, 15, Percy street, Fitzroy square. C. 1863. *Referee* 1870-6. *Lib. Com.* 1859-60.
- 1878 HOOD, DONALD WILLIAM CHARLES, M.B., M.D. Cantab., Assistant Physician to the West London Hospital; 43, Green street, Park lane.
- 1879 HOOD, FRANCIS E. C., Surgeon, Army Medical Department, Agra, India.
- 1878 HOUGHTON, WALTER B., M.D., Assistant Physician to, and Lecturer on Medical Jurisprudence at, Charing Cross Hospital; 26, Cavendish square [and Bournemouth].
- 1865 HOWARD, BENJAMIN, M.D., New York, U.S.
- 1865 HOWARD, EDWARD, M.D.
- 1874 HOWSE, HENRY GREENWAY, M.S. Lond., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital; Surgeon to the Evelina Hospital for Sick Children; Examiner in Anatomy in the University of London; 10, St. Thomas's street, Southwark. *Sci. Com.* 1879. *Trans.* 2.
- 1877 \*HUDSON, ROBERT SAMUEL, M.D., 58, West-end, Redruth, Cornwall.
- 1857 HULKE, JOHN WHITAKER, F.R.S., *Librarian*, Surgeon to the Middlesex Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 10, Old Burlington street. C. 1871-2. S. 1876-7. L. 1879-81. *Sci. Com.* 1867. *Lib. Com.* 1864-8. *Trans.* 8.

*Elected*

- 1857 HULME, EDWARD CHARLES, Woodbridge road, Guildford.  
*Trans.* 1.
- 1844 †HUMBY, EDWIN, M.D., 83, Hamilton terrace, St. John's wood. C. 1866-7.
- 1855 HUMPHRY, GEORGE MURRAY, M.D., F.R.S., Surgeon to Addenbrooke's Hospital; Professor of Human Anatomy and Physiology in the Cambridge University Medical School; Cambridge. *Trans.* 6.
- 1873 HUNTER, WILLIAM GUYER, M.D., Principal of, and Professor of Medicine in, Grant Medical College, Bombay; Surgeon-Major, Bombay Army, Bombay.
- 1849 HUSSEY, EDWARD LAW, Senior Surgeon to the Radcliffe Infirmary, and Consulting Surgeon to the County Lunatic Asylum and the Warneford Asylum; 8, St. Aldate's, Oxford. *Trans.* 1.
- 1856 HUTCHINSON, JONATHAN, Senior Surgeon to the London Hospital; Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; and Surgeon to the Hospital for Diseases of the Skin; 15, Cavendish square. C. 1870. *Referee*, 1876-81. *Lib. Com.* 1864-5. *Trans.* 9. *Pro.* 2.
- 1820 HUTCHINSON, WILLIAM, M.D.
- 1840 †HUTTON, CHARLES, M.D., Consulting Physician to the General Lying-in Hospital; 26, Lowndes street, Belgrave square. C. 1858-9.
- 1866 ILES, FRANCOIS HENRY WILSON, M.D., Watford, Herts.
- 1847 IMAGE, WILLIAM EDMUND, Consulting Surgeon to the Suffolk General Hospital; Bury St. Edmund's, Suffolk.  
*Trans.* 1.
- 1856 INGLIS, CORNELIUS, M.D., Cairo. [Athenæum Club, Pall Mall.]
- 1871 JACKSON, J. HUGHLINGS, M.D., F.R.S., Physician to the London Hospital; Physician to the National Hospital for the Paralysed and Epileptic; 3, Manchester square.
- 1841 †JACKSON, PAUL, 51, Wellington road, St. John's Wood. C. 1862.



*Elected*

- 1863 JACKSON, THOMAS VINCENT, Surgeon to the South Staffordshire General Hospital; Darlington st., Wolverhampton.
- 1841 JACOBOVICS, MAXIMILIAN MORITZ, M.D., Vienna.
- 1825 JAMES, JOHN B., M.D.
- 1840 \*JENKS, GEORGE SAMUEL, M.D., 18, Circus, Bath.
- 1851 JENNER, SIR WILLIAM, Bart., M.D., K.C.B., D.C.L., LL.D., F.R.S., Physician in Ordinary to H.M. the Queen, and to H.R.H. the Prince of Wales; Emeritus Professor of Clinical Medicine in University College, London; and Consulting Physician to University College Hospital; Member of the Senate of the University of London; 63, Brook street, Grosvenor square. C. 1864. V.P. 1875. *Referee*, 1855, 1859-63. *Trans.* 3.
- 1881 JENNINGS, WILLIAM OSCAR, M.D., 8, Rue Roy, Paris.
- 1851 JOHNSON, EDMUND CHARLES, Corresponding Member of the Medical and Philosophical Society of Florence, and of "l'Institut Gènevois."
- 1847 †JOHNSON, GEORGE, M.D., F.R.S., Physician to King's College Hospital; Member of the Senate of the University of London; 11, Savile row, Burlington gardens. C. 1862-3. V.P. 1870. L. 1878-80. *Referee*, 1853-61, 1864-9. *Lib.Com.* 1860-1. *Trans.* 10.
- 1868 JOHNSTON, WILLIAM, M.D., 21, Upper Grosvenor road, Tunbridge Wells.
- 1848 JOHNSTONE, ATHOL ARCHIBALD WOOD, Consulting Surgeon to the Brighton Hospital for Sick Children, St. Moritz House, 61, Dyke road, Brighton. *Lib. Com.* 1860. *Trans.* 1.
- 1876 JONES, LESLIE, M.D., Medical Officer of Health for Blackpool; 3, Brighton Parade, Blackpool, Lancashire.
- 1875 \*JONES, PHILIP SYDNEY, M.D., Consulting Surgeon to the Sydney Infirmary; Examiner in Medicine, Sydney University; 10, College street, Sydney, New South Wales. [Agents: Messrs. D. Jones & Co., 1, Gresham buildings, Basinghall street.]
- 1837 †JONES, THOMAS WILLIAM, M.D., Bylocks, Enfield Highway. C. 1858.

*Elected*

- 1859 JONES, WILLIAM PRICE, M.D., Claremont road, Surbiton, Kingston.
- 1865 JORDAN, FURNEAUX, Surgeon to the Queen's Hospital, and Professor of Surgery at the Queen's College, Birmingham; 22, Colmore row, Birmingham.
- 1816 \*KAUFFMANN, GEORGE HERMANN, M.D., Hanover.
- 1872 KELLY, CHARLES, M.D., Professor of Hygiene at King's College, London, and Medical Officer of Health for the West Sussex Combined Sanitary District, Worthing, Sussex.
- 1848 \*KENDELL, DANIEL BURTON, M.D., Heath House, Wakefield, Yorkshire.
1877. \*KHOBY, RUSTONJEE NASERWANJEE, M.D. Brussels; Physician to the Parell Dispensary, Bombay; Lecturer to Native Midwives, Grant Medical College, Bombay.
- 1857 KIALLMARK, HENRY WALTER, 5, Pembridge gardens, Bayswater.
- 1851 KINGDON, JOHN ABERNETHY, Surgeon to the City of London Truss Society, and to the City Dispensary; 2, New Bank buildings, Lothbury. C. 1866-7. V.P. 1872-3. *Sci. Com.* 1867. *Trans.* 1.
- 1855 LANE, JAMES ROBERT, Surgeon to, and Lecturer on Surgery at, St. Mary's Hospital; Consulting Surgeon to the Lock Hospital; 49, Norfolk square, Hyde park. C. 1870. *Referee*, 1869, 1877-81. *Lib. Com.* 1869. *Trans.* 1.
- 1840 †LANE, SAMUEL ARMSTRONG, Consulting Surgeon to St. Mary's Hospital and to the Lock Hospital; 49, Norfolk square, Hyde park. C. 1849-50. V.P. 1865. *Referee*, 1850.
- 1865 LANGTON, JOHN, Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital; Surgeon to the City of London Truss Society; 2, Harley street, Cavendish square. C. 1881. *Lib. Com.* 1879-80.

*Elected*

- 1873 \***LARCHER, O., M.D.**, Laureate of the Institute of France, of the Medical Faculty, and Academy of Paris, &c.; 97, Rue de Passy, Passy, Paris.
- 1841 \***LASHMAR, CHARLES, M.D.**, 83, North End, Croydon, Surrey.
- 1862 **LATHAM, PETER WALLWORK, M.A., M.D.**, Downing Professor of Medicine, Cambridge University; Physician to Addenbrooke's Hospital, Cambridge; 17, Trumpington street, Cambridge.
- 1816 **LAWRENCE, G. E.**
- 1880 **LAYCOCK, GEORGE LOCKWOOD, M.B.**, 12, Upper Berkeley street, Portman square.
- 1843 †**LEE, HENRY**, Consulting Surgeon to St. George's Hospital; 9, Savile row, Burlington gardens. C. 1856-7. L. 1863-4. V.P. 1868-9. *Referee*, 1855, 1866-8. *Sci. Com.* 1867. *Trans.* 13. *Pro.* 2.
- 1877 **LEESON, ARTHUR EDMUND, M.A., M.D.**, 45, Devonshire street, Portland Place.
- 1869 **LEGG, JOHN WICKHAM, M.D.**, Assistant Physician to, and Lecturer on Pathological Anatomy at, St. Bartholomew's Hospital; 47, Green street, Park lane. *Lib. Com.* 1878-81. *Trans.* 2.
- 1836 **LEIGHTON, FREDERICK, M.D.**
- 1872 **LIEBREICH, RICHARD**, Consulting Ophthalmic Surgeon to St. Thomas's Hospital; Paris.
- 1806 **LIND, JOHN, M.D.**
- 1878 **LISTER, JOSEPH, D.C.L., LL.D., F.R.S.**, Surgeon Extraordinary to H.M. the Queen; Professor of Clinical Surgery at King's College, London; and Surgeon to King's College Hospital; 12, Park crescent, Regent's park.
- 1872 \***LITTLE, DAVID, M.D.**, Surgeon to the Royal Eye Hospital, Manchester; 21, St. John's street, Manchester.
- 1871 **LITTLE, LOUIS STROMEYER**, Shanghai, China.
- 1870 **LIVINGSTON, JOHN, M.D.**, New Barnet, Hertfordshire.

*Elected*

- 1819 LLOYD, ROBERT, M.D.
- 1820 LOCHER, J. G., M.C.D., Town Physician of Zurich.  
*Trans. 2.*
- 1860 LONGMORE, THOMAS, C.B., Hon. Surgeon to H.M. the Queen; Surgeon-General, Army Medical Staff, and Professor of Military Surgery, Army Medical School, Netley, Southampton; Woolston Lawn, Woolston, Hants. *Trans. 2.*
- 1836 LÖWENFELD, JOSEPH S., M.D., Berbice.
- 1871 LOWNDS, THOMAS MACKFORD, M.D., late Professor of Anatomy and Physiology at Grant Medical College, Bombay; Egham Hill, Surrey.
- 1877 LOWNE, BENJAMIN THOMPSON, Lecturer on Physiology, Middlesex Hospital Medical School; 65, Cambridge gardens, Notting hill.
- 1881 LUCAS, RICHARD CLEMENT, Senior Assistant Surgeon to, and Demonstrator of Operative and Practical Surgery at, Guy's Hospital; Surgeon to the Evelina Hospital for Sick Children; 18, Finsbury square.
- 1879 LYELL, ROBERT W., Assistant Surgeon to the Middlesex Hospital; Assistant Surgeon to the Royal London Ophthalmic Hospital; 26, Harley street, Cavendish square.  
*Trans. 1.*
- 1857 LYON, FELIX WILLIAM, M.D., 118, Princes street, Edinburgh.
- 1867 MABERLY, GEORGE FREDERICK, 98, Collins street east, Melbourne, Victoria.
- 1873 MACCARTHY, JEREMIAH, M.A., Surgeon to, and Lecturer on Physiology at, the London Hospital; Examiner in Surgery in the University of London; 15, Finsbury square.
- 1867 MACCORMAC, WILLIAM, M.A., Surgeon to, and Lecturer on Surgery at, St. Thomas's Hospital; 13, Harley street. *Trans. 1.*
- 1862 \*M'DONNELL, ROBERT, M.D., F.R.S., Surgeon to Steevens' Hospital; 14, Lower Pembroke street, Dublin.  
*Trans. 2.*

*Elected*

- 1846 M'EWEN, WILLIAM, M.D., Surgeon to Chester Castle ; 27, Nicholas street, Chester.
- 1880 \*MACFARLANE, ALEXANDER WILLIAM, M.D., Consulting Physician to the Kilmarnock Fever Hospital and Infirmary ; Walmer, Kilmarnock, N.B.
- 1866 MACGOWAN, ALEXANDER THORBURN, Vyvyan House, Clifton, near Bristol.
- 1880 McHARDY, MALCOLM MACDONALD, Ophthalmic Surgeon to King's College Hospital ; Surgeon to the Royal South London Ophthalmic Hospital ; 5, Savile Row.
- 1823 †MACILWAIN, GEORGE, Consulting Surgeon to the Finsbury Dispensary, Matching, Harlow, Essex. C. 1829-30. V.P. 1848. *Referee*, 1849-50. *Lib. Com.* 1838. *Trans.* 1.
- 1822 MACINTOSH, RICHARD, M.D.
- 1859 \*M'INTYRE, JOHN, M.D., Odiham, Hants.
- 1873 MACKELLAR, ALEXANDER OBERLIN, M.S.I., Assistant Surgeon, St. Thomas's Hospital, Albert Embankment, Westminster Bridge ; Westminster Palace Hotel, Victoria street.
- 1881 MACKENZIE, STEPHEN, M.D., Senior Assistant Physician, and Physician in charge of Department of Skin Diseases at the London Hospital ; 26, Finsbury square.
- 1876 MACKEY, EDWARD, M.D., 123, Western road, Brighton.
- 1854 \*MACKINDER, DRAPER, M.D., Consulting Surgeon to the Dispensary, Gainsborough, Lincolnshire.
- 1879 MACLAGAN, THOMAS JOHN, M.D., 9, Cadogan place, Belgrave square.
- 1860 MACLEAN, JOHN, M.D., 24, Portman street, Portman square.
- 1876 MACNAMARA, CHARLES, Surgeon to, and Lecturer on Surgery at, the Westminster Hospital ; Surgeon Major Bengal Medical Service ; Fellow of the Calcutta University ; 13, Grosvenor street.
- 1842 MACNAUGHT, JOHN, M.D., 74, Huskisson street, Liverpool.
- 1880 MADDICK, EDMUND D., 184, Brixton road,

*Elected*

- 1880 MAKINS, GEORGE HENRY, Blackheath park.
- 1876 MAILLAM, BENJAMIN, Meadow Side, Leacroft road, Staines.
- 1855 MARCET, WILLIAM, M.D., F.R.S.; 39, Grosvenor street, and Villa Bianca, Cannes. C. 1871. *Referee*, 1866-70. *Sci. Com.* 1863. *Lib. Com.* 1866-8. *Trans.* 3.
- 1867 MARSH, F. HOWARD, Assistant-Surgeon to St. Bartholomew's Hospital; Assistant Surgeon to the Hospital for Sick Children, Great Ormond street; 36, Bruton street, Berkeley square. *Lib. Com.* 1880-81. *Trans.* 2.
- 1838 MARSH, THOMAS PARR, M.D.
- 1851 MARSHALL, JOHN, F.R.S., Professor of Anatomy to the Royal Academy of Arts; Professor of Surgery in University College, London, and Surgeon to University College Hospital; 10, Savile row, Burlington gardens. C. 1866. V.P. 1875-6. *Referee*, 1867, 1871-4, 1877-81. *Trans.* 2.
- 1864 MASON, FRANCIS, Surgeon to, and Lecturer on Operative Surgery at, St. Thomas's Hospital; 5, Brook street, Grosvenor square. C. 1880-81. *Trans.* 1.
- 1839 MEADE, RICHARD HENRY, Consulting Surgeon to the Bradford Infirmary; Bradford, Yorkshire. *Trans.* 1.
- 1870 MEADOWS, ALFRED, M.D., Physician-Accoucheur to, and Lecturer on Midwifery at, St. Mary's Hospital; 27, George street, Hanover square. *Lib. Com.* 1875-7.
- 1865 MEDWIN, AARON GEORGE, M.D., Dental Surgeon to the Royal Kent Dispensary, 34, Bruton street, Berkeley square, and 11, Montpellier row, Blackheath, Kent.
- 1880 MEREDITH, WILLIAM APPLETON, M.B., C.M., Assistant Surgeon to the Samaritan Free Hospital for Women and Children; 14, Old Burlington street.
- 1867 MEREDYTH, COLOMIATI, M.D., 10, George street, Hanover square.
- 1874 MERRIMAN, JOHN J., 45, Kensington square.
- 1815 MEYER, AUGUSTUS, M.D., St. Petersburg.
- 1840 MIDDLEMORE, RICHARD, Consulting Surgeon to the Birmingham Eye Hospital; 19, Temple row, Birmingham.
- 1854 MIDDLESHIP, EDWARD ARCHIBALD.

*Elected*

- 1873 MILNER, EDWARD, Surgeon to the Lock Hospital; 32, New Cavendish street, Portland place.
- 1844 †MONTEFIORE, NATHANIEL, 18, Portman square.
- 1873 MOORE, NORMAN, M.D., Warden of the College and Lecturer on Comparative Anatomy, Demonstrator of Morbid Anatomy, St. Bartholomew's Hospital; the College, St. Bartholomew's Hospital.
- 1861 MOREHEAD, CHARLES, M.D., Hon. Surgeon to H.M. the Queen; Deputy-Inspector General of Hospitals; 11, North manor place, Edinburgh. *Referee*, 1862-4.
- 1857 MORGAN, JOHN, 3, Sussex place, Hyde park gardens. C. 1880. *Lib. Com.* 1862-3. *Trans.* 1.
- 1861 MORGAN, JOHN EDWARD, M.D., Physician to the Manchester Royal Infirmary, and Professor of Medicine in the Owens College, Manchester; 1, St. Peter's square, Manchester.
- 1878 MORGAN, JOHN HAMMOND, M.A., Assistant Surgeon to the Charing Cross Hospital, and to the Hospital for Sick Children, Great Ormond street; 12, Chapel street, Park lane.
- 1874 MORRIS, HENRY, M.A. Lond., Surgeon to, and Lecturer on Surgery at, the Middlesex Hospital; 2, Mansfield street, Portland place. *Trans.* 5.
- 1879 MORRIS, MALCOLM ALEXANDER, Lecturer on Skin Diseases at St. Mary's Hospital; 63, Montagu square.
- 1851 MOUAT, FREDERIC JOHN, M.D., Deputy Inspector-General of Hospitals; Medical Inspector to the Local Government Board; and Member of the Senate of the University of Calcutta; 12, Durham villas, Kensington.
- 1868 MOXON, WALTER, M.D., F.L.S., Physician to, and Lecturer on Materia Medica at, Guy's Hospital; 6, Finsbury Circus. *Referee*, 1879-81. *Trans.* 1.
- 1879 MUNK, WILLIAM, M.D., Harveian Librarian, Royal College of Physicians; Consulting Physician to the Royal Hospital for Incurables; 40, Finsbury square.
- 1875 MURPHY, WILLIAM KIRKPATRICK, M.A., M.D., 29, Queen Anne street, Cavendish square.

*Elected*

- 1873 MURRAY, IVOR, M.D., F.R.S. Ed., 8, Huntriss Row, Scarborough.
- 1880 MURRELL, WILLIAM, M.D., Assistant Physician to the Royal Hospital for Diseases of the Chest; Lecturer on Materia Medica and Therapeutics at the Westminster Hospital; 38, Weymouth street, Cavendish square.
- 1863 MYERS, ARTHUR BOWEN RICHARDS, Surgeon to the 1st Battalion, Coldstream Guards; Hospital, Vincent square, Westminster. C. 1878-9. *Lib. Com.* 1877.
- 1870 NEILD, JAMES EDWARD, M.D., Lecturer on Forensic Medicine in the University of Melbourne; 166, Collins street east, Melbourne, Victoria.
- 1835 †NELSON, THOMAS ANDREW, M.D., 10, Nottingham terrace, York gate, Regent's park. *Lib. Com.* 1841.
- 1877 NETTLESHIP, EDWARD, Ophthalmic Surgeon to, and Lecturer on Ophthalmology at, St. Thomas's Hospital; Ophthalmic Surgeon to the Hospital for Sick Children; 4, Wimpole street, Cavendish square.
- 1843 †NEWTON, EDWARD, 85, Gloucester terrace, Hyde Park. C. 1863-4.
- 1868 NICHOLLS, JAMES, M.D., Duke street, Chelmsford, Essex.
- 1849 NORMAN, HENRY BURFORD, Portland Lodge, Southsea, Hants. *Lib. Com.* 1857.
- 1847 \*NOURSE, WILLIAM EDWARD CHARLES, late Surgeon to the Brighton Children's Hospital; Bouverie House, Mount Radford, Exeter.
- 1864 NUNN, THOMAS WILLIAM, Consulting Surgeon to the Middlesex Hospital; 8, Stratford place, Oxford street.
- 1870 NUNNELEY, FREDERICK BARHAM, M.D. *Trans.* 2.
- 1880 O'CONNOR, BERNARD, A.B., M.D., 40, Brook street, Grosvenor square.
- 1847 O'CONNOR, THOMAS, March, Cambridgeshire.
- 1880 OGILVIE, GEORGE, M.B., Lecturer on Experimental Physics at the Westminster Hospital; 27, Welbeck street, Cavendish square.
- 1880 OGILVIE, LESLIE, M.B., Lecturer on Comparative Anatomy at the Westminster Hospital; 40, Weymouth street, Cavendish square.



*Elected*

- 1858 OGLE, JOHN WILLIAM, M.D., Consulting-Physician to St. George's Hospital; 30, Cavendish square. C. 1873. *Referee*, 1864-72. *Trans.* 4.
- 1855 \*OGLE, WILLIAM, M.A., M.D., Physician to the Derby Infirmary; The Elms, Duffield road, Derby.
- 1860 OGLE, WILLIAM, M.D., Superintendent of Statistics in the Registrar General's Department, Somerset House; 10, Gordon street, Gordon square. S. 1868-70. C. 1876-7. *Lib. Com.* 1871-5. *Trans.* 4.
- 1870 OLDHAM, CHARLES FREDERIC, India [Agents: Messrs. Grindlay and Co., 55, Parliament Street].
- 1871 \*O'NEILL, WILLIAM, M.D., Physician to the Lincoln Lunatic Hospital, Lincoln.
- 1873 ORD, WILLIAM MILLER, M.D., Physician to, and Lecturer on Medicine at, St. Thomas's Hospital; 7, Brook street, Hanover square. *Trans.* 6.
- 1877 ORMEROD, JOSEPH ARDERNE, M.B., Casualty Physician to St. Bartholomew's Hospital; 25, Upper Wimpole street.
- 1875 OSBORN, SAMUEL, 10, Maddox street, Regent street, and 17, Gresham park, Brixton.
- 1879 OWEN, EDMUND, Surgeon (with charge of out-patients) to St. Mary's Hospital; Surgeon to the Hospital for Sick Children; 49, Seymour street, Portman square.
- 1874 PAGE, HERBERT WILLIAM, M.A., M.C. Cantab., Surgeon (with charge of out-patients) to, and Lecturer on Operative and Practical Surgery at, St. Mary's Hospital; 146, Harley street, Cavendish square. *Trans.* 1.
- 1847 \*PAGE, WILLIAM BOUSFIELD, Consulting Surgeon to the Cumberland Infirmary, Carlisle. *Trans.* 2.
- 1840 †PAGET, SIR JAMES, Bart., D.C.L., LL.D., F.R.S., Sergeant-Surgeon to H.M. the Queen; Surgeon-in-Ordinary to H.R.H. the Prince of Wales; Consulting Surgeon to St. Bartholomew's Hospital; Member of the Senate of the University of London; 1, Harewood place, Hanover square. C. 1848-9. V.P. 1861. T. 1867. P. 1875-6. *Referee*, 1844-6, 1848, 1851-60, 1862-6, 1868-74. *Sci. Com.* 1863. *Lib. Com.* 1846-7. *Trans.* 11,

*Elected*

- 1858 \*PALEY, WILLIAM, M.D., Physician to the Ripon Dispensary ; Ripon, Yorkshire.
- 1847 PARKER, NICHOLAS, M.D., Paris.
- 1873 PARKER, ROBERT WILLIAM, Assistant-Surgeon to the East London Children's Hospital ; 8, Old Cavendish-street. *Trans.* 2.
- 1841 PARKIN, JOHN, M.D., 5, Codrington place, Brighton.
- 1865 PAVY, FREDERICK WILLIAM, M.D., F.R.S., Physician to, and Lecturer on Medicine at, Guy's Hospital ; 35, Grosvenor street. *Referee*, 1871-81. *Trans.* 1.
- 1869 PAYNE, JOSEPH FRANK, M.D., Assistant-Physician to, and Lecturer on Pathological Anatomy at, St. Thomas's Hospital ; 78, Wimpole street, Cavendish square. *Sci. Com.* 1879. *Lib. Com.* 1878-81.
- 1845 †PEACOCK, THOMAS BEVILL, M.D., Consulting Physician to St. Thomas's Hospital ; Consulting Physician to the City of London Hospital for Diseases of the Chest, Victoria Park ; 20, Finsbury circus. S. 1855-6. V.P. 1867. C. 1869. *Referee*, 1857-66. *Lib. Com.* 1855. *Trans.* 2.
- 1879 PEEL, ROBERT, L.K.Q.C.P.I., 130, Collins street east, Melbourne, Victoria.
- 1856 PEIRCE, RICHARD KING, 96, Addison road, Kensington.
- 1830 PELECHIN, CHARLES P., M.D., St. Petersburg.
- 1855 \*PEMBERTON, OLIVER, Surgeon to the Birmingham General Hospital, and Professor of Surgery at the Queen's College, Birmingham ; 12, Temple row, Birmingham. *Trans.* 1.
- 1874 PENHALL, JOHN THOMAS, 5, Eversfield place, St. Leonard's, Sussex.
- 1870 PERRIN, JOHN BESWICK, late Medical Tutor and Demonstrator of Practical and Surgical Anatomy, Owen's College ; Vernon House, Leigh, Lancashire.
- 1879 \*PESIKAKA, HORMASJI DOSABHAI, L.R.C.P. Glasg., Marine Lines, Bombay.
- 1878 \*PHILIPSON, GEORGE HARE, M.D., M.A. Cantab., Professor of Medicine at Durham University ; Senior Physician to the Newcastle-upon-Tyne Infirmary ; 7, Eldon square, Newcastle-upon-Tyne.

*Elected*

- 1852 PHILLIPS, RICHARD, 27, Leinster square, Bayswater. C. 1877.
- 1867 PICK, THOMAS PICKERING, Surgeon to, and Lecturer on Anatomy at, St. George's Hospital; 13, South Eaton place, Eaton square. *Sci. Com.* 1870. *Lib. Com.* 1879-81.
- 1841 †PITMAN, HENRY ALFRED, M.D., Consulting Physician to St. George's Hospital, and to the Royal General Dispensary, St. Pancras; 28, Gordon square. L. 1851-3. C. 1861-2. T. 1863-8. V.P. 1870-1. *Referee*, 1849-50. *Lib. Com.* 1847.
- 1871 POLLOCK, ARTHUR JULIUS, M.D., Physician to, and Lecturer on the Principles and Practice of Medicine at, Charing Cross Hospital; Physician to the Foundling Hospital; 85, Harley street, Cavendish square.
- 1845 †POLLOCK, GEORGE DAVID, Surgeon-in-Ordinary to H.R.H. the Prince of Wales; Consulting Surgeon to St. George's Hospital; 36, Grosvenor street. C. 1856-7. L. 1859-62. V.P. 1870-1. *Referee*, 1858, 1864-9, 1877-81. *Trans.* 4.
- 1865 POLLOCK, JAMES EDWARD, M.D., Physician to the Hospital for Consumption, Brompton; 52, Upper Brook street, Grosvenor square. *Referee*, 1872-81.
- 1871 POORE, GEORGE VIVIÁN, M.D., Professor of Medical Jurisprudence in University College; Assistant-Physician to University College Hospital; Physician to the Royal Infirmary for Children and Women, Waterloo road; Examiner in Forensic Medicine in the University of London; 30, Wimpole street. *Trans.* 1.
- 1846 POTTER, JEPHSON, M.D., F.L.S.
- 1842 POWELL, JAMES, M.D.
- 1867 POWELL, RICHARD DOUGLAS, M.D., Physician to the Middlesex Hospital; Physician to the Hospital for Consumption and Diseases of the Chest, Brompton; 15, Henrietta street, Cavendish sq. *Referee*, 1879-81. *Trans.* 2.
- 1867 POWER, HENRY, Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. Bartholomew's Hospital; 37A, Gt. Cumberland place, Hyde park. *Referee*, 1870-81. *Sci. Com.* 1870. *Lib. Com.* 1872-8.

*Elected*

- 1857 PRIESTLEY, WILLIAM OVEREND, M.D., Consulting Physician-Accoucheur to King's College Hospital, and to the St. Marylebone Infirmary; 17, Hertford street, Mayfair. C. 1874-5. *Referee*, 1867-73, 1877-81. *Sci. Com.* 1863.
- 1874 PURVES, WILLIAM LAIDLAW, Aural Surgeon to Guy's Hospital; 20, Stratford place, Oxford street. *Trans.* 2.
- 1878 PYE, WALTER, Surgeon (with charge of out-patients) to St. Mary's Hospital; 4, Sackville street, Piccadilly.
- 1877 PYE-SMITH, PHILIP HENRY, M.D., Assistant-Physician to, and Lecturer on Physiology at, Guy's Hospital; Examiner in Physiology at the University of London; 54, Harley street, Cavendish square.
- 1850 QUAIN, RICHARD, M.D., F.R.S., Consulting Physician to the Hospital for Consumption, Brompton; Member of the Senate of the University of London; 67, Harley street, Cavendish square. C. 1866-7. V.P. 1878-9. *Sci. Com.* 1863. *Trans.* 1.
- 1835 †QUAIN, RICHARD, F.R.S., Surgeon-Extraordinary to H.M. the Queen; Emeritus Professor of Clinical Surgery, University College, London, and Consulting Surgeon to University College Hospital; 32, Cavendish square. C. 1838-9. L. 1846-8. T. 1851-3. V.P. 1856-7. *Referee*, 1845-6, 1848, 1858-9. *Lib. Com.* 1846. *Trans.* 1. *Pro.* 2.
- 1852 RADCLIFFE, CHARLES BLAND, M.D., *Treasurer*, Consulting Physician to the Westminster Hospital; Physician to the National Hospital for the Paralysed and Epileptic; 25, Cavendish square. C. 1867-8. V.P. 1879-80. T. 1881. *Referee*, 1862-6, 1870-8.
- 1871 RALFE, CHARLES HENRY, M.D., M.A., Assistant Physician to the London Hospital, and late Physician to the Seamen's Hospital, Greenwich; 26, Queen Anne street, Cavendish square.
- 1857 RANKE, HENRY, M.D., 3, Sophienstrasse, Munich.
- 1854 RANSOM, WILLIAM HENRY, M.D., F.R.S., Physician to the Nottingham General Hospital, Nottingham.
- 1869 READ, THOMAS LAURENCE, 57, Gloucester road [11, Peter-sham terrace], Queen's gate, South Kensington.

*Elected*

- 1858 REED, FREDERICK GEORGE, M.D., 46, Hertford street, Mayfair. *Trans.* 1.
- 1821 REEDER, HENRY, M.D., Varick, Seneca County, New York, United States.
- 1857 REES, GEORGE OWEN, M.D., F.R.S., Consulting Physician to Guy's Hospital; 26, Albemarle street, Piccadilly. C. 1873. *Referee*, 1860-72, 1875-81. *Trans.* 1.
- 1855 REYNOLDS, JOHN RUSSELL, M.D., F.R.S., Physician-in-Ordinary to H.M.'s Household; Consulting-Physician to University College Hospital; 38, Grosvenor street. C. 1870. *Referee*, 1867-9.
- 1865 RHODES, GEORGE WINTER, Surgeon to the Huddersfield Infirmary; Queen street south, Huddersfield.
- 1881 RICE, GEORGE, M.B., C.M. Edinb., The Infirmary, Plumstead, Kent.
- 1852 RICHARDSON, CHRISTOPHER THOMAS, M.B., 13, Nelson crescent, Ramsgate.
- 1845 †RIDGE, BENJAMIN, M.D., 8, Mount street, Grosvenor square.
- 1863 RINGER, SYDNEY, M.D., Professor of the Principles and Practice of Medicine in University College, London, and Physician to University College Hospital; 15, Cavendish place, Cavendish square. C. 1881. *Referee*, 1873-80. *Trans.* 4.
- 1871 RIVINGTON, WALTER, M.S., Surgeon to, and Lecturer on Anatomy at, the London Hospital; 22, Finsbury square. *Trans.* 2.
- 1871 \*ROBERTS, DAVID LLOYD, M.D., Physician to St. Mary's Hospital, Manchester; 23, St. John's street, Deansgate, Manchester.
- 1878 ROBERTS, FREDERICK THOMAS, M.D., Professor of Materia Medica and Therapeutics in University College, London; and Physician to University College Hospital; Examiner in Materia Medica in the University of London; 53, Harley street, Cavendish square, W.
- 1857 ROBERTSON, JOHN CHARLES GEORGE, Medical Superintendent of the Cavan District Lunatic Asylum; Monaghan, Ireland.

*Elected*

- 1873 ROBERTSON, WILLIAM H., M.D., Consulting Physician to the Devonshire Hospital and Buxton Bath Charity; Buxton, Derbyshire.
- 1843 RODEN, WILLIAM, M.D., Morningside, Kidderminster, Worcestershire.
- 1850 ROPER, GEORGE, M.D., Consulting Physician to the Eastern Division of the Royal Maternity Charity; Physician to the Royal Infirmary for Children and Women, Waterloo Bridge road; 7, Queen Anne street, Cavendish square. C. 1879-80.
- 1857 ROSE, HENRY COOPER, M.D., F.L.S., Surgeon to the Hampstead Dispensary; Penrose House, Hampstead. *Trans.* 1.
- 1849 †ROUTH, CHARLES HENRY FELIX, M.D., Physician to the Samaritan Free Hospital for Women and Children; 52, Montagu square. *Lib. Com.* 1854-5. *Trans.* 1.
- 1863 ROWE, THOMAS SMITH, M.D., Surgeon to the Royal Sea-Bathing Infirmary; Cecil street, Margate, Kent.
- 1845 RUSSELL, JAMES, M.D., Physician to the Birmingham General Hospital; 91, New Hall street, Birmingham.
- 1871 RUTHERFORD, WILLIAM, M.D., F.R.S., Professor of Physiology in the University of Edinburgh; 14, Douglas crescent, Edinburgh.
- 1856 SALTER, S. JAMES A., M.B., F.R.S., F.L.S., late Lecturer on Dental Surgery at Guy's Hospital; Basingfield, near Basingstoke, Hants. C. 1871. *Lib. Com.* 1878. *Trans.* 2.
- 1849 †SANDERSON, HUGH JAMES, M.D., 26, Upper Berkeley street, Portman square. C. 1872-3. *Lib. Com.* 1862-3.
- 1855 SANDERSON, JOHN BURDON, M.D., LL.D., F.R.S., Jodrell Professor of Human Physiology and Histology at University College, London; 26, Gordon square. C. 1869-70. *Referee*, 1867-8, 1876-81. *Sci. Com.* 1862, 1870. *Lib. Com.* 1876-81. *Trans.* 2.
- 1867 SANDFORD, FOLLIOTT JAMES, M.D., Market Drayton, Shropshire.

*Elected*

- 1879 SANGSTER, ALFRED, B.A., M.B., Lecturer on Skin Diseases at the Charing Cross Hospital; 7, Old Burlington street. *Trans.* 1.
- 1847 †SANKEY, WILLIAM HENRY OCTAVIUS, M.D., Sandywell park, Andoversford, Cheltenham.
- 1869 SANSOM, ARTHUR ERNEST, M.D., Physician (with charge of out-patients) to the London Hospital; 30, Devonshire street, Portland place. *Trans.* 2.
- 1845 †SAUNDERS, EDWIN, Surgeon-Dentist to H.M. the Queen, and to H.R.H. the Prince of Wales; 13A, George street, Hanover square. C. 1872-3.
- 1834 SAUVAN, LUDWIG V., M.D., Warsaw.
- 1879 SAVAGE, GEORGE HENRY, M.D., Bethlem Royal Hospital, St. George's road, Southwark.
- 1859 SAVORY, WILLIAM SCOVELL, F.R.S., Surgeon to, and Lecturer on Surgery at, St. Bartholomew's Hospital; Surgeon to Christ's Hospital; 66, Brook street, Grosvenor square. C. 1871-2. L. 1878. *Referee*, 1865-70, 1873-77, 1879-81. *Sci. Com.* 1862, 1867, 1870. *Lib. Com.* 1866-8. *Trans.* 6.
- 1873 SCOTT, JOHN MOORE JOHNSTON, M.D., Lurgan, County Armagh.
- 1861 \*SCOTT, WILLIAM, M.D., Physician to the Huddersfield Infirmary; Waverley House, Huddersfield.
- 1863 SEDGWICK, WILLIAM, 12, Park place, Upper Baker street. *Trans.* 2.
- 1877 SEMON, FELIX, M.D., 59, Welbeck street, Cavendish square.
- 1875 SEMPLE, ROBERT HUNTER, M.D., Physician to the Bloomsbury Dispensary; 8, Torrington square. *Sci. Com.* 1879.
- 1873 \*SHAPTER, LEWIS, B.A., M.B., Physician to the Devon and Exeter Hospital; the Barnfield, Exeter.
- 1840 SHARP, WILLIAM, M.D., F.R.S., Horton House, Rugby. *Trans.* 1.
- 1836 †SHAW, ALEXANDER, Consulting Surgeon to the Middlesex Hospital; 136, Abbey road, Kilburn. C. 1842. S. 1843-4. V.P. 1851-2. T. 1858-60. *Referee*, 1842-3, 1846-50, 1855-7, 1865. *Lib. Com.* 1843. *Trans.* 4.

*Elected*

- 1859 SIBLEY, SEPTIMUS WILLIAM, 7, Harley street, Cavendish square. *Sci. Com.* 1863. *Trans.* 4.
- 1848 †SIEVEKING, EDWARD HENRY, M.D., *Librarian*, Physician-Extraordinary to H.M. the Queen; Physician-in-Ordinary to H.R.H. the Prince of Wales; Physician to St. Mary's Hospital; 17, Manchester square. C. 1859-60. S. 1861-3. V.P. 1873-4. L. 1881. *Referee*, 1855-8, 1864-72, 1875-80. *Sci. Com.* 1862. *Trans.* 2.
- 1871 SILVER, ALEXANDER, M.D., Physician to, and Lecturer on Clinical Medicine at, Charing Cross Hospital; 2, Stafford street, Bond street.
- 1842 †SIMON, JOHN, C.B., D.C.L., LL.D., F.R.S., Consulting Surgeon to St. Thomas's Hospital; 40, Kensington square. C. 1854-5. V.P. 1865. *Referee* 1851-3, 1866-81. *Trans.* 1.
- 1865 SIMS, J. MARION, M.D., Surgeon to the New York State Women's Hospital; 267, Madison Avenue, New York.
- 1857 SIORDET, JAMES LEWIS, M.B., Villa Preti, Mentone, Nice.
- 1879 SMITH, E. NOBLE, 24, Queen Anne street, Cavendish square.
- 1881 SMITH, EUSTACE, M.D., Physician to H.M. the King of the Belgians; Physician to the East London Hospital for Children, and to the City of London Hospital for Diseases of the Chest; 5, George street, Hanover square.
- 1872 SMITH, GILBART, M.A., M.D., Assistant-Physician to the London Hospital; Physician to the Royal Hospital for Diseases of the Chest, City road; 68, Harley street, Cavendish square. *Trans.* 1.
- 1866 SMITH, HEYWOOD, M.A. M.D. Oxon., Physician to the Hospital for Women; Physician to the British Lying-in Hospital; 18, Harley street, Cavendish square.
- 1838 †SMITH, SPENCER, Consulting Surgeon to St. Mary's Hospital; 92, Oxford terrace, Hyde Park. C. 1854. S. 1855-8. V.P. 1859-60. T. 1865. *Referee*, 1851-3, 1862-4, 1866-78. *Lib. Com.* 1847.



*Elected*

- 1863 SMITH, THOMAS, Surgeon to, and Lecturer on Clinical Surgery at, St. Bartholomew's Hospital; Surgeon to the Hospital for Sick Children; 5, Stratford place, Oxford street. S. 1870-2. C. 1875-76. *Referee*, 1873-4, 1880-81. *Sci. Com.* 1867. *Trans.* 3.
- 1847 SMITH, WILLIAM J., M.D., Consulting Physician to the Weymouth Infirmary; Greenhill, Weymouth, Dorsetshire.
- 1873 SMITH, W. JOHNSON, Surgeon to the Seamen's Hospital, Greenwich.
- 1874 \*SMITH, WILLIAM ROBERT, M.D., F.R.S. Ed., Physician to the Dispensary, Cheltenham; 15, Imperial square, Cheltenham.
- 1868 SOLLY, SAMUEL EDWIN, Colorado Springs, Colorado, U.S.
- 1865 SOUTHEY, REGINALD, M.D., Physician to, and Lecturer on Forensic Medicine at, St. Bartholomew's Hospital; 6, Harley street, Cavendish square. *Referee*, 1873-80. *Trans.* 1.
- 1844 SPACKMAN, FREDERICK R., M.D., Harpenden, St. Alban's.
- 1851 SPITTA, ROBERT JOHN, M.D. Lond., East Side, Clapham Common, Surrey. C. 1878-9. *Trans.* 1.
- 1875 SPITTA, EDMUND J., Ivy House, Clapham Common, Surrey.
- 1854 STEVENS, HENRY, M.D., Inspector, Medical Department, Local Government Board; Greenford House, Sutton, Surrey.
- 1842 †STEWART, ALEXANDER PATRICK, M.D., Consulting Physician to the Middlesex Hospital; 75, Grosvenor street. C. 1856-7. L. 1863-8. V.P. 1871-2.
- 1859 STEWART, WILLIAM EDWARD, 16, Harley street, Cavendish square.
- 1879 STIRLING, EDWARD CHARLES, late Assistant Surgeon and Lecturer on Physiology at St. George's Hospital; Adelaide, South Australia.
- 1856 STOCKER, ALONZO HENRY, M.D., Peckham House, Peckham,

*Elected*

- 1865 STOKES, WILLIAM, M.D., Examiner in Surgery, Queen's University, Ireland, and Surgeon to the Richmond Surgical Hospital; 5, Merrion square north, Dublin. *Trans.* 1.
- 1843 STORKS, ROBERT REEVE, Paris.
- 1858 †STREATFEILD, JOHN FREMLYN, Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Professor of Clinical Ophthalmic Surgery in University College, and Senior Ophthalmic Surgeon to University College Hospital; 15, Upper Brook street, Grosvenor square. C. 1874-5. *Lib. Com.* 1867-8.
- 1871 STRONG, HENRY JOHN, M.D., 64, North End, Croydon.
- 1863 STURGES, OCTAVIUS, M.D., Physician to, and Lecturer on Medicine at, the Westminster Hospital; Assistant-Physician to the Hospital for Sick Children; 85, Wimpole street, Cavendish square. C. 1878-9. *Referee*, 1881.
- 1871 SUTHERLAND, HENRY, M.D., Lecturer on Insanity at the Westminster Hospital; 6, Richmond terrace, Whitehall.
- 1860 SUTRO, SIGISMUND, M.D., Senior Physician to the German Hospital; 37A, Finsbury square.
- 1871 SUTTON, HENRY GAWEN, M.B., Physician to, and Lecturer on Pathology at, the London Hospital, and Physician to the City of London Hospital for Diseases of the Chest; 9, Finsbury square. *Trans.* 1.
- 1855 SUTTON, JOHN MAULE, M.D., Medical Officer of Health, Oldham; 244, Great Clowes street, Broughton, Manchester.
- 1861 \*SWEETING, GEORGE BACON, King's Lynn, Norfolk.
- 1878 \*SYMPSON, THOMAS, Surgeon to the Lincoln County Hospital; 3, James street, Lincoln.
- 1870 TAIT, LAWSON, Surgeon to the Birmingham and Midland Hospital for Women; 7, Great Charles street, Birmingham. *Trans.* 4.
- 1864 TAUSSIG, GABRIEL, M.D., 70, Piazza Barberini, Rome.

*Elected*

- 1875 TAY, WARREN, Surgeon to the London Hospital and Surgeon to the North Eastern Hospital for Children and the Hospital for Skin Diseases, Blackfriars; 4, Finsbury square.
- 1873 TAYLOR, FREDERICK, M.D., Assistant-Physician to Guy's Hospital; 15, St. Thomas's street, Southwark. *Trans.* 1.
- 1852 TAYLOR, ROBERT, 7, Lower Seymour street, Portman square.
- 1845 †TAYLOR, THOMAS, Warwick House, 1, Warwick place, Grove End road, St. John's wood.
- 1859 TEGART, EDWARD, 49, Jermyn street, St. James's.
- 1874 THIN, GEORGE, M.D., 22, Queen Anne street, Cavendish square. *Trans.* 8.
- 1862 THOMPSON, EDMUND SYMES, M.D., Physician to the Hospital for Consumption, Brompton; Gresham Professor of Medicine; 33, Cavendish square. S. 1871-4. C. 1878-9. *Referee*, 1876-7. *Trans.* 1.
- 1857 THOMPSON, HENRY, M.D., Consulting Physician to the Middlesex Hospital; 53, Queen Anne street, Cavendish square.
- 1852 THOMPSON, SIR HENRY, Surgeon-Extraordinary to H.M. the King of the Belgians; Emeritus Professor of Clinical Surgery in University College, London; and Consulting Surgeon to University College Hospital; 35, Wimpole street, Cavendish square. C. 1869. *Trans.* 5.
- 1862 THOMPSON, REGINALD EDWARD, M.D., *Secretary*, Physician to the Hospital for Consumption, Brompton; 9, Cranley place, South Kensington. C. 1879. S. 1880-81. *Referee*, 1873-8. *Sci. Com.* 1867. *Trans.* 2.
- 1876 THORNTON, JOHN KNOWSLEY, M.B., C.M., Surgeon to the Samaritan Free Hospital for Women and Children; 22, Portman street, Portman square. *Trans.* 2.
- 1875 TIBBITS, HERBERT, F.R.C.P. Ed., 68, Wimpole street.
- 1848 †TILT, EDWARD JOHN, M.D., Consulting Physician to the Farringdon General Dispensary and Lying-in Charity; 27, Seymour street, Portman square. *Referee*, 1874-81.

*Elected*

- 1880 TIVY, WILLIAM JAMES, 1, Tottenham place, Clifton, Bristol.
- 1872 TOMES, CHARLES S., B.A., F.R.S., Lecturer on Anatomy and Physiology at the Dental Hospital; 37, Cavendish square. *Lib. Com.* 1879.
- 1867 TONGE, MORRIS, M.D., Harrow-on-the-Hill, Middlesex.
- 1871 \*TREND, THEOPHILUS W., M.D., Raeberry Lodge, Southampton.
- 1879 TREVES, FREDERICK, Assistant Surgeon to the London Hospital; 18, Gordon square.
- 1881 \*TREVES, WILLIAM KNIGHT, Surgeon to the Royal Sea Bathing Infirmary for Scrofula; 31, Dalby square, Cliftonville, Margate.
- 1867 TROTTER, JOHN WILLIAM, Surgeon-Major, Coldstream Guards; Bossall Vicarage, York.
- 1859 TRUMAN, EDWIN THOMAS, Surgeon-Dentist in Ordinary to Her Majesty's Household; 23, Old Burlington street.
- 1864 TUFNELL, THOMAS JOLLIFFE, Consulting Surgeon to the City of Dublin Hospital; 58, Lower Mount street, Merrion square, Dublin. *Trans.* 1.
- 1862 TUKE, THOMAS HARRINGTON, M.D., Manor House, Chiswick, and 37, Albemarle street, Piccadilly.
- 1875 TURNER, FRANCIS CHARLEWOOD, M.A., M.D., Physician to the London Hospital; 15, Finsbury square.
- 1873 TURNER, GEORGE BROWN, M.D., San Remo, Italy.
- 1881 TYSON, WILLIAM JOSEPH, M.B., Medical Officer of the Folkestone Infirmary; 89, Sandgate road, Folkestone.
- 1876 VENN, ALBERT JOHN, M.D., Obstetric Physician to the Metropolitan Free Hospital; Assistant Physician to the Victoria Hospital for Children; 8, Upper Brook street, Grosvenor square.
- 1870 VENNING, EDGCOMBE, late Surgeon, 1st Life Guards; 87, Sloane street.
- 1865 VERNON, BOWATER JOHN, Ophthalmic Surgeon to St. Bartholomew's Hospital and to the West London Hospital; 33, Curzon street, Mayfair.
- 1867 VINTRAS, ACHILLE, M.D., Physician to the French Embassy and to the French Hospital, Lisle street, Leicester square; 141, Regent street.

*Elected*

- 1828 VULPES, BENEDETTO, M.D., Physician to the Hospital of Aversa, and the Hospital of Incurables, Naples.
- 1854 WADDINGTON, EDWARD, Hamilton, Auckland, New Zealand.
- 1870 WADHAM, WILLIAM, M.D., Physician to, and Lecturer on Clinical Medicine at, St. George's Hospital; 14, Park lane.
- 1864 WAITE, CHARLES DERBY, M.B., Senior Physician to the Westminster General Dispensary; 3, Old Burlington street.
- 1868 \*WALKER, ROBERT, L.R.C.P. Edinb., Surgeon to the Carlisle Dispensary; 2, Portland square, Carlisle.
- 1867 \*WALLIS, GEORGE, Surgeon to Addenbrooke's Hospital, Corpus Buildings, Cambridge.
- 1873 WALSHAM, WILLIAM JOHNSON, C.M., Assistant Surgeon to, and Demonstrator of Anatomy and Operative Surgery at, St. Bartholomew's Hospital; Surgeon to the Metropolitan Free Hospital and to the Royal Hospital for Diseases of the Chest, City Road; 27, Weymouth street, Portland place. *Trans.* 2.
- 1852 WALSHE, WALTER HAYLE, M.D., Emeritus Professor of the Principles and Practice of Medicine, University College, London; Consulting Physician to the Hospital for Consumption; 41, Hyde park square. C. 1872. *Trans.* 1.
- 1851 WALTON, HAYNES, Senior Surgeon to St. Mary's Hospital, 1, Brook street, Grosvenor square. *Trans.* 1. *Pro.* 1.
- 1852 WANE, DANIEL, M.D., 20, Grafton street, Berkeley square.
- 1821 WARD, WILLIAM TILLEARD, Tilleards, Stanhope, Canada.
- 1858 WARDELL, JOHN RICHARD, M.D., Calverley park, Tunbridge Wells.
- 1846 WARE, JAMES THOMAS, Tilford House, near Farnham, Surrey.
- 1818 WARE, JOHN, Clifton Down, near Bristol.
- 1866 WARING, EDWARD JOHN, C.I.E., M.D., 49, Clifton gardens, Maida vale. *Referee*, 1881.

*Elected*

- 1877 WARNER, FRANCIS, M.D., Assistant Physician to the London Hospital and to the East London Hospital for Children ; 24, Harley street, Cavendish square.
- 1861 WATERS, A. T. HOUGHTON, M.D., Physician to the Royal Infirmary, and Lecturer on the Principles and Practice of Medicine, in the Liverpool Royal Infirmary School of Medicine ; 69, Bedford street, Liverpool. *Trans.* 3.
- 1879 WATERS, JOHN HENRY, M.D., C.M., 101, Jermyn street.
- 1878 WATNEY, HERBERT, M.D., Assistant Physician to St. George's Hospital ; 1, Wilton crescent, Belgrave square.
- 1837 †WATSON, SIR THOMAS, Bart., M.D., D.C.L., F.R.S., Physician-in-Ordinary to H.M. the Queen ; Consulting Physician to King's College Hospital ; 16, Henrietta street, Cavendish square. C. 1840-1, 1852. V.P. 1845-6. *Referee*, 1842-5, 1847-9.
- 1861 †WATSON, WILLIAM SPENCER, M.B., Surgeon to the Great Northern Hospital ; Surgeon to the Royal South London Ophthalmic Hospital ; 7, Henrietta street, Cavendish square. *Trans.* 1.
- 1879 WATTEVILLE, ARMAND DE, M.B., B.S., Medical Electrician to St. Mary's Hospital ; 9, Wimpole street, Cavendish square.
- 1854 WEBB, WILLIAM, M.D., Gilkin View House, Wirksworth, Derbyshire.
- 1840 WEBB, WILLIAM WOODHAM, M.D.
- 1842 †WEBER, FREDERIC, M.D., 44, Green street, Park lane. C. 1857. V.P. 1865.
- 1857 WEBER, HERMANN, M.D., Physician to the German Hospital ; 10, Grosvenor street, Grosvenor square. C. 1874-5. *Referee*, 1869-73, 1878-81. *Lib. Com.* 1864-73. *Trans.* 6.
- 1844 †WEGG, WILLIAM, M.D., 15, Hertford street, Mayfair. L. 1854-8. C. 1861-2. T. 1873-80. *Lib. Com.* 1851-3.
- 1878 WEISS, HUBERT FOVEAUX, 30A, George street, Hanover square.
- 1874 WELLS, HARRY, M.D., British Vice-Consulate, Gualaguay-chu, Entre Rios, Argentine Confederation.

*Elected*

- 1854 WELLS, THOMAS SPENCER, *Vice-President*, Surgeon-in-Ordinary to H.M.'s Household; Surgeon to the Samaritan Free Hospital for Women and Children; 3, Upper Grosvenor street. C. 1870. V.P. 1881. *Trans.* 11. *Pro.* 1.
- 1842 †WEST, CHARLES, M.D., Corresponding Member of the Academy of Medicine of Paris; Nice, Alpes Maritimes, France. C. 1855-6. V.P. 1863. P. 1877-8. *Referee*, 1848-54, 1857-62, 1864-76, 1880. *Sci. Com.* 1863. *Lib. Com.* 1844-7, 1851. *Trans.* 2.
- 1877 WEST, SAMUEL, M.B., Casualty Physician and Medical Tutor at St. Bartholomew's Hospital; Assistant Physician to the City of London Hospital for Diseases of the Chest, Victoria Park; 15, Wimpole street, Cavendish square.
- 1881 WHARRY, ROBERT, M.D., 6, Gordon square.
- 1878 WHARTON, HENRY THORNTON, M.A., Surgeon to the Kilburn Dispensary; 39, St. George's road, Kilburn.
- 1828 WHATLEY, JOHN, M.D.
- 1875 WHIPHAM, THOMAS TILLYER, M.B., Physician to, and Lecturer on Clinical Medicine at, St. George's Hospital; 11, Grosvenor street, Grosvenor square.
- 1849 WHITE, JOHN.
- 1881 WHITE, WILLIAM HALE, M.D., Evelina Hospital for Sick Children, Southwark bridge road.
- 1877 WHITMORE, WILLIAM TICKLE, 7, Arlington street, Piccadilly.
- 1852 WIBLIN, JOHN, M.D., Medical Inspector of Emigrants and Recruits; Southampton. *Trans.* 1.
- 1870 \*WILKIN, JOHN F., M.D. and M.C., New Beckenham, Kent.
- 1837 WILKS, GEORGE AUGUSTUS FREDERICK, M.D., Stanbury, Torquay.
- 1863 WILKS, SAMUEL, M.D., F.R.S., Physician to, and Lecturer on Medicine at, Guy's Hospital; Physician in Ordinary to their Royal Highnesses the Duke and Duchess of Connaught; 72, Grosvenor street, Grosvenor square. *Referee*, 1872-81. *Sci. Com.* 1.

*Elected*

- 1865 †WILLETT, ALFRED, Surgeon to St. Bartholomew's Hospital; Surgeon to St. Luke's Hospital; 36, Wimpole street, Cavendish square. C. 1880-81. *Trans.* 1.
- 1864 WILLETT, EDMUND SPARSHALL, M.D., Resident Physician, Wyke House, Isleworth, Middlesex.
- 1840 †WILLIAMS, CHARLES JAMES BLASIUS, M.D., F.R.S., Physician-Extraordinary to H.M. the Queen; Consulting Physician to the Hospital for Consumption, Brompton [47, Upper Brook street, Grosvenor square]. C. 1849-50. V.P. 1860-1. P. 1873-4. *Referee*, 1843-4. *Sci. Com.* 1862. *Trans.* 1.
- 1859 \*WILLIAMS, CHARLES, Surgeon to the Norfolk and Norwich Hospital; 9, Prince of Wales road, Norwich.
- 1866 WILLIAMS, CHARLES THEODORE, M.D., Physician to the Hospital for Consumption, Brompton; 47, Upper Brook street, Grosvenor square. *Lib. Com.* 1880-81. *Trans.* 3.
- 1872 WILLIAMS, JOHN, M.D., Assistant Obstetric Physician to University College Hospital; 28, Harley street, Cavendish square. *Referee*, 1878-81. *Lib. Com.* 1876-81.
- 1859 WILLIAMS, JOSEPH, M.D. Holmhurst, Cambridge park, Twickenham.
- 1868 WILLIAMS, WILLIAM RHYS, M.D., Commissioner in Lunacy; 19, Whitehall placē.
- 1839 †WILSON, ERASMUS, F.R.S., late Professor of Dermatology, Royal College of Surgeons of England; 17, Henrietta street, Cavendish square. C. 1877. *Lib. Com.* 1845. *Trans.* 2.
- 1863 WILSON, ROBERT JAMES, F.R.C.P. Edin., 7, Warrior square, St. Leonard's-on-Sea, Sussex.
- 1850 \*WISE, ROBERT STANTON, M.D., Consulting Physician to the Southam Eye and Ear Infirmary; Banbury, Oxfordshire.
- 1825 WISE, THOMAS ALEXANDER, M.D., Thornton, Beulah hill, Upper Norwood, Surrey.
- 1879 WOAKES, EDWARD, M.D., 57, Harley street, Cavendish square.



*Elected*

- 1841 WOOD, GEORGE LEIGHTON, 28, Green park, Bath.
- 1851 WOOD, JOHN, F.R.S., Professor of Clinical Surgery in King's College, London, and Senior Surgeon to King's College Hospital; Examiner in Surgery in the University of London; 61, Wimpole street, Cavendish square. C. 1867-8. V.P. 1877-8. *Referee*, 1871-6, 1880-81. *Lib. Com.* 1866. *Trans.* 3.
- 1848 †WOOD, WILLIAM, M.D., Physician to St. Luke's Hospital for Lunatics; 99, Harley street, Cavendish square. C. 1867-8. V.P. 1877-8.
- 1881 WOODMAN, SAMUEL, Consulting Surgeon to the Ramsgate and St. Lawrence Royal Dispensary; 5, Prospect terrace, Ramsgate.
- 1879 WOODWARD, G. P. M., M.D., Deputy Surgeon-General, Clarendon House, Norwood road, Tulse hill.
- 1842 WORTHINGTON, WILLIAM COLLINS, London road, Lowestoft, Suffolk. *Trans.* 3.
- 1865 WOTTON, HENRY, M.D., 62, Bedford gardens, Kensington.
- 1878 YEO, GERALD F., M.D., M.Ch., Professor of Physiology in King's College, London; King's College, Strand.

---

[It is particularly requested that any change of Title, Appointment, or Residence, may be communicated to the Secretaries before the 1st of October in each year, in order that the List may be made as correct as possible.]

HONORARY FELLOWS.

(Limited to Twelve.)

*Elected*

- 1847 CHADWICK, EDWIN, C.B., Corresponding Member of the Academy of Moral and Political Sciences of the Institute of France; Park Cottage, East Sheen.
- 1873 CHRISTISON, SIR ROBERT, Bart., M.D., D.C.L., LL.D., Physician-in-Ordinary to H M. the Queen in Scotland; 40, Moray place, Edinburgh.
- 1868 DARWIN, CHARLES, M.A., F.R.S., Corresponding Member of the Academies of Sciences of Berlin, Stockholm, Dresden, &c.; Down, Bromley, Kent.
- 1857 FARR, WILLIAM, M.D., C.B., D.C.L., F.R.S., 78, Portsdown road, Maida hill.
- 1868 HOOKER, SIR JOSEPH DARTON, M.D., C.B., K.C.S.I., D.C.L., LL.D., F.R.S., Member of the Senate of the University of London, Director of the Royal Botanic Gardens, Kew; Corresponding Member of the Academy of Sciences of the Institute of France; Royal Gardens, Kew.
- 1868 HUXLEY, THOMAS HENRY, LL.D., F.R.S., Professor of Natural History in the Royal School of Mines; Secretary to the Royal Society; Corresponding Member of the Academies of Sciences of St. Petersburg, Berlin, Dresden, &c.; 4, Marlborough place, St. John's wood.
- 1878 LUBBOCK, SIR JOHN, Bart., F.R.S., High Elms, Bromley, Kent.

***Elected***

- 1847 OWEN, RICHARD, C.B., D.C.L., LL.D., F.R.S., Superintendent of the Natural History Departments in the British Museum ; Foreign Associate of the Academy of Sciences of the Institute of France ; Sheen Lodge, Mortlake.
- 1873 STOKES, GEORGE GABRIEL, M.A., D.C.L., LL.D., Lucasian Professor of Mathematics in the University of Cambridge ; Secretary to the Royal Society, &c. ; Lensfield Cottage, Cambridge.
- 1868 TYNDALL, JOHN, D.C.L., LL.D., F.R.S., Professor of Natural Philosophy in the Royal Institution ; Corresponding Member of the Academies and Societies of Sciences of Göttingen, Haarlem, Geneva, &c. ; Royal Institution, Albemarle street, Piccadilly.

## FOREIGN HONORARY FELLOWS.

(Limited to Twenty.)

*Elected*

- 1878 BACCELLI, GUIDO, M.D., Professor of Medicine at Rome.
- 1876 BILLROTH, THEODOR, M.D., Professor of Surgery in the University of Vienna; Vienna.
- 1864 DONDEERS, FRANZ CORNELIUS, M.D., LL.D., Professor of Physiology and Ophthalmology at the University of Utrecht.
- 1875 DEAPER, JOHN WILLIAM, M.A., LL.D., Emeritus Professor of Chemistry and Physiology in the University of New York; 13, University Buildings, Washington square, New York.
- 1876 EDWARDS, H. MILNE, M.D., Member of the Institute of France, and of the Academy of Medicine; Dean of the Faculty of Sciences and Professor at the Museum of Natural History of Paris; 57, Rue Cuvier, Paris.
- 1835 EKSTRÖMER, CARL JOHAN, M.D., C.M., K.P.S., and W., Physician to the King of Sweden; President of the College of Health, and Director-General of Hospitals; Stockholm.
- 1868 GROSS, SAMUEL D., M.D., F.C.P. Philad., D.C.L. Oxon., LL.D. Camb., Professor of Surgery in the Jefferson Medical College of Philadelphia.
- 1878 GUENEAU DE MUSSY, NOEL, M.D., Member of the Academy of Medicine; Physician to the "Hôtel Dieu;" 4, Rue St. Arnaud, Paris.
- 1866 HANNOVER, ADOLPH, M.D., Professor at Copenhagen.
- 1873 HELMHOLTZ, HERMANN LUDWIG FERDINAND, Professor of Physics and Physiological Optics; Berlin.
- 1859 HENLE, J., M.D., Professor of Anatomy at Göttingen.

*Elected*

- 1873 HOFMANN, A. W., LL.D., Ph.D., Professor of Chemistry, Berlin.
- 1868 KÖLLIKER, ALBERT, Professor of Anatomy in the University of Würzburg.
- 1856 LANGENBECK, BERNHARD, M.D., Professor of Surgery in the University of Berlin.
- 1868 LARREY, HIPPOLYTE BARON, Member of the Institute of France; Inspector of the "Service de Santé Militaire," and Member of the "Conseil de Santé des Armées;" Commander of the Legion of Honour, &c.; Rue de Lille, 91, Paris.
- 1862 PIROGOFF, NIKOLAUS, M.D., Professor of Surgery to the Medico-Chirurgical Academy in St. Petersburg, and Director of the Anatomical Institute; Consulting Physician to the Hospitals Obuchow, Peter-Paul, and Maria Magdalena; St. Petersburg.
- 1878 SCANZONI, FRIEDRICH WILHELM VON, Royal Bavarian Privy Councillor, and Professor of Medicine in the University of Würzburg.
- 1878 SCHWANN, THEODOR, M.D., Professor at the Royal University of Liege, Belgium.
- 1856 VIRCHOW, RUDOLPH, M.D., Professor of Pathological Anatomy in the University of Berlin; Corresponding Member of the Academy of Sciences of the Institute of France; Berlin.

# LIST OF RESIDENT FELLOWS

ARRANGED ACCORDING TO

DATE OF ELECTION.

- |   |                                   |
|---|-----------------------------------|
| 1819 Jas. M. Arnott, F.R.S.             | 1843 Edward Newton.               |
| 1823 George Macilwain.                  | 1844 Arthur Farre, M.D., F.R.S.   |
| 1828 Cæsar H. Hawkins, F.R.S.           | William Wegg, M.D.                |
| 1833 Sir George Burrows, M.D., F.R.S.   | Thomas King Chambers, M.D.        |
| Thomas A. Barker, M.D.                  | Nathaniel Montefiore.             |
| 1835 Richard Quain, F.R.S.              | Edwin Humby.                      |
| Thomas A. Nelson, M.D.                  | 1845 Thomas B. Peacock, M.D.      |
| 1836 Alexander Shaw.                    | Samuel Cartwright.                |
| J. George French.                       | George D. Pollock.                |
| 1837 Sir Thomas Watson, M.D., F.R.S.    | Thomas Taylor.                    |
| Thomas Blizard Curling, F.R.S.          | Edwin Saunders.                   |
| George Busk, F.R.S.                     | William Oliver Chalk.             |
| Thomas William Jones, M.D.              | Edward U. Berry.                  |
| 1838 Charles Hawkins.                   | Benjamin Ridge, M.D.              |
| Henry Spencer Smith.                    | 1846 John A. Bostock.             |
| 1839 T. Graham Balfour, M.D., F.R.S.    | Barnard Wight Holt.               |
| W. J. Erasmus Wilson, F.R.S.            | Carsten Holthouse.                |
| Fred. Le Gros Clark, F.R.S.             | 1847 Andrew Whyte Barclay, M.D.   |
| James Dixon.                            | W. H. O. Sankey, M.D.             |
| 1840 Chas. J. B. Williams, M.D., F.R.S. | George Johnson, M.D., F.R.S.      |
| Charles Hutton, M.D.                    | George Critchett.                 |
| Samuel A. Lane.                         | 1848 Edward H. Sieveking, M.D.    |
| Sir James Paget, F.R.S.                 | Edward Ballard, M.D.              |
| 1841 Henry A. Pitman, M.D.              | William Wood, M.D.                |
| William Bowman, F.R.S.                  | Thomas Hawksley, M.D.             |
| John Parkin, M.D.                       | Edward John Tilt, M.D.            |
| Paul Jackson.                           | John Clarke, M.D.                 |
| 1842 Charles West, M.D.                 | John Gay.                         |
| Frederic Weber, M.D.                    | John Gregory Forbes.              |
| Alex. P. Stewart, M.D.                  | 1849 Hugh J. Sanderson, M.D.      |
| John Simon, C.B., F.R.S.                | C. H. F. Routh, M.D.              |
| John Erichsen, F.R.S.                   | Edmund L. Birkett, M.D.           |
| Oscar M. P. Clayton.                    | George T. Fincham, M.D.           |
| 1843 Robert Greenhalgh, M.D.            | Sir William W. Gull, M.D., F.R.S. |
| Prescott G. Hewett, F.R.S.              | 1850 Richard Quain, M.D., F.R.S.  |
| Henry Lee.                              | George Roper, M.D.                |
| Wm. White Cooper.                       | 1851 Sir Wm. Jenner, Bt., M.D.    |
| Luther Holden.                          | H. Haynes Walton, F.R.S.          |

- |  |   |
|--|---|
| <p>1851 John Birkett.<br/>John A. Kingdon.<br/>Peter Y. Gowlland.<br/>Frederic John Mouat, M.D.<br/>John Marshall, F.R.S.<br/>John Wood, F.R.S.<br/>Bernard E. Brodhurst.<br/>Robert J. Spitta, M.D.<br/>George Gaskoin.</p> <p>1852 C. Bland Radcliffe, M.D.<br/>Daniel Wane, M.D.<br/>Walter H. Walshe, M.D.<br/>William Adams.<br/>John Cooper Forster.<br/>Sir Henry Thompson.<br/>Robert Taylor.<br/>Richard Phillips.</p> <p>1853 Robert Brudenell Carter.<br/>Joseph T. Clover.</p> <p>1854 Alfred Baring Garrod, M.D., F.R.S.<br/>Samuel O. Habershon, M.D.<br/>Thomas Spencer Wells.<br/>Peter Hinckes Bird.</p> <p>1855 W. M. Graily Hewitt, M.D.<br/>J. Burdon Sanderson, M.D., F.R.S.<br/>J. Russell Reynolds, M.D., F.R.S.<br/>James Robert Lane.<br/>Walter John Bryant, M.D.</p> <p>1856 Charles J. Hare, M.D.<br/>William Bird.<br/>S. James A. Salter.<br/>Jonathan Hutchinson.<br/>Timothy Holmes.<br/>Richard King Peirce.<br/>Alonzo H. Stocker, M.D.</p> <p>1857 William Overend Priestley, M.D.<br/>George Harley, M.D., F.R.S.<br/>Henry Thompson, M.D.<br/>Hermann Weber, M.D.<br/>George Owen Rees, M.D., F.R.S.<br/>John Whitaker Hulke, F.R.S.<br/>John Morgan.<br/>Henry Cooper Rose, M.D.<br/>Henry Walter Kiallmark.</p> <p>1858 Fred. George Reed, M.D.<br/>William Chapman Begley, M.D.<br/>John William Ogle, M.D.<br/>Wilson Fox, M.D., F.R.S.<br/>John Richard Wardell, M.D.<br/>John Fremlyn Streatfeild.<br/>Francis Harris, M.D.</p> <p>1859 Wm. Howship Dickinson, M.D.<br/>William Scovell Savory, F.R.S.<br/>Edwin Thomas Truman.</p> | <p>1859 Francis Hird.<br/>Richard Barwell.<br/>Edward Tegart.<br/>Septimus William Sibley.<br/>William E. Stewart.</p> <p>1860 Andrew Clark, M.D.<br/>E. H. Greenhow, M.D., F.R.S.<br/>John Maclean, M.D.<br/>Sigismund Sutro, M.D.<br/>William Ogle, M.D.<br/>Thomas Bryant.<br/>John Couper.<br/>Henry Howard Hayward.</p> <p>1861 Robert Barnes, M.D.<br/>William Spencer Watson.<br/>William Henry Holman.</p> <p>1862 James Andrew, M.D.<br/>Lionel Smith Beale, M.B., F.R.S.<br/>Thomas H. Tuke, M.D.<br/>Horace B. Dobell, M.D.<br/>Edmund Symes Thompson, M.D.<br/>Reginald Edward Thompson, M.D.<br/>Robert Farquharson, M.D.<br/>William Henry Brace, M.D.<br/>George Cowell.<br/>M. Berkeley Hill.</p> <p>1863 Octavius Sturges, M.D.<br/>John Langdon H. Down, M.D.<br/>Samuel Wilks, M.D., F.R.S.<br/>Samuel Fenwick, M.D.<br/>Julius Althaus, M.D.<br/>Sydney Ringer, M.D.<br/>Thomas Smith.<br/>Arthur B. R. Myers.<br/>Arthur E. Durham.<br/>William Sedgwick.</p> <p>1864 Charles Hilton Fagge, M.D.<br/>George Buchanan, M.D.<br/>Charles Derby Waite, M.B.<br/>John Harley, M.D.<br/>Walter John Coulson.<br/>Thomas William Nunn.<br/>Francis Mason.<br/>Jos. Gillman Barratt, M.D.</p> <p>1865 Charles Robert Drysdale, M.D.<br/>James Edward Pollock, M.D.<br/>William Cholmeley, M.D.<br/>Reginald Southey, M.D.<br/>George Fielding Blandford, M.D.<br/>Dyce Duckworth, M.D.<br/>Frederick W. Pavy, M.D., F.R.S.<br/>William Morratt Baker.<br/>John Langton.<br/>Frederick James Gant.</p> |
|--|---|

- 1865 Alfred Willett.  
Bowater John Vernon.  
Alfred Cooper.  
Christopher Heath.  
Henry Wotton.
- 1866 Thomas Fitzpatrick, M.D.  
Samuel Jones Gee, M.D.  
Charles Theodore Williams, M.D.  
Heywood Smith, M.D.  
John Crockett Fish, M.D.  
William Selby Church, M.D.  
Edward John Waring, M.D.  
William Fairlie Clarke, M.D.  
Philip H. Harper.
- 1867 William Henry Day, M.D.  
Achille Vintras, M.D.  
Richard Douglas Powell, M.D.  
F. Howard Marsh.  
Henry Power.  
William MacCormac.  
Thomas Pickering Pick.  
John Astley Bloxam.  
Charles Arthur Aikin.  
Samuel Hill, M.D.  
Colomiati Meredyth, M.D.
- 1868 H. Charlton Bastian, M.D., F.R.S.  
William Henry Broadbent, M.D.  
Thomas Buzzard, M.D.  
John Cavafy, M.D.  
Walter Butler Cheadle, M.D.  
John Cockle, M.D.  
William Johnston, M.D.  
T. Henry Green, M.D.  
William Rhys Williams, M.D.  
Walter Moxon, M.D.  
William Chapman Grigg, M.D.  
John Croft.  
George Eastes.  
William Henry Freeman.
- 1869 Joseph Frank Payne, M.D.  
Arthur E. Sansom, M.D.  
John Wickham Legg, M.D.  
Charles Elam, M.D.  
Thomas Laurence Read.
- 1870 Alfred Meadows, M.D.  
William Wadham, M.D.  
J. Warrington Haward.  
Edgcombe Venning.  
Clement Godson, M.D.
- 1871 William Cayley, M.D.  
Charles Henry Ralfe, M.D.  
Arthur Julius Pollock, M.D.  
Thomas L. Brunton, M.D., F.R.S.  
Henry Gawen Sutton, M.D.
- 1871 J. Hughlings Jackson, M.D., F.R.S.  
Henry Sutherland, M.D.  
George Vivian Poore, M.D.  
Alexander Silver, M.D.  
Walter Rivington.  
Marcus Beck.  
Edward Bellamy.  
William F. Butt.  
Benjamin Duke.
- 1872 Gilbert Smith, M.D.  
Thomas B. Christie, M.D.  
George B. Brodie, M.D.  
John Williams, M.D.  
Sir J. Fayer, M.D., F.R.S.  
Richard Liebreich.  
Charles S. Tomes, B.A., F.R.S.  
William Bartlett Dalby.
- 1873 William Miller Ord, M.D.  
Frederick Taylor, M.D.  
Norman Moore, M.D.  
John Curnow, M.D.  
William R. Gowers, M.D.  
Jeremiah McCarthy.  
Wm. Johnson Smith.  
Robert William Parker.  
Alex. O. McKellar.  
Henry T. Butlin.  
Charles Higgins.  
William J. Walsham.  
Edward Milner.
- 1874 Alfred Lewis Galabin, M.D.  
George Thin, M.D.  
Alfred B. Duffin, M.D.  
James H. Aveling, M.D.  
Theodore Duka, M.D.  
Evan B. Baxter, M.D.  
John M. Bruce, M.D.  
Henry Morris.  
William Laidlaw Purves.  
William Harrison Cripps.  
Henry G. Howse.  
Herbert William Page.  
Frederic Durham.  
John J. Merriman.
- 1875 Thomas T. Whipham, M.B.  
Francis Charlewood Turner, M.D.  
William K. Murphy, M.D.  
Herbert Tibbits, F.R.C.P. Ed.  
Robert Hunter Semple, M.D.  
Thomas Crawford Hayes, M.D.  
William S. Greenfield, M.D.  
Charles Henry Carter, M.D.  
Fletcher Beach, M.B.  
Samuel Osborn.



- |  |  |
|--|--|
| <p>1875 Waren Tay.<br/>Edmund J. Spitta.</p> <p>1876 Thomas Barlow, M.D.<br/>Robert Bridges, M.B.<br/>John C. Bucknill, M.D., F.R.S.<br/>Wm. Lewis Dudley, M.D.<br/>Albert J. Venn, M.D.<br/>Edward Mackey, M.D.<br/>John Knowsley Thornton.<br/>Charles Macnamara.<br/>John N. C. Davies-Colley.</p> <p>1877 Felix Semon, M.D.<br/>Sidney Coupland, M.D.<br/>Francis Warner, M.D.<br/>T. Cranstoun Charles, M.D.<br/>William Ewart, M.B.<br/>Alfred Pearce Gould.<br/>J. Rickman Godlee.<br/>Alban H. G. Doran.<br/>Arthur Edmund Leeson, M.D.<br/>George Ernest Herman, M.D.<br/>Samuel West, M.B.<br/>John Abercrombie, M.B.<br/>J. Matthews Duncan, M.D.,<br/>F.R.S. Ed.<br/>Henry de Fonmartin, M.D.<br/>George Allan Heron, M.D.<br/>Joseph A. Ormerod, M.B.<br/>P. Henry Pye-Smith, M.D.<br/>Edward Nettleship.<br/>William Henry Bennett.<br/>Benj. T. Lowne.<br/>William T. Whitmore.</p> <p>1878 Jas. Crichton Browne, M.D.<br/>Walter B. Houghton, M.D.<br/>Fred. T. Roberts, M.D.<br/>Joseph Lister, F.R.S.<br/>Clinton T. Dent.<br/>John H. Morgan.<br/>Walter Pye.<br/>Gerald F. Yeo.<br/>Wm. J. Vereker Bindon, M.D.<br/>Donald W. Charles Hood, M.B.<br/>Henry Gervis, M.D.<br/>Herbert Watney, M.D.<br/>Richard Davy.<br/>Hubert Foveaux Weiss.<br/>Henry Thornton Wharton.</p> <p>1879 Alfred Sangster, M.B.<br/>Edward Woakes, M.D.<br/>Armand de Watteville.</p> | <p>1879 Malcolm A. Morris.<br/>A. E. Cumberbatch.<br/>Edmund Owen.<br/>Arthur E. J. Barker.<br/>Frederick Treves.<br/>Horatio Donkin, M.B.<br/>Thomas John MacLagan, M.D.<br/>David White Finlay, M.D.<br/>Andrew Clark.<br/>Robert Lyell.<br/>S. Hamilton Cartwright.<br/>John H. Waters, M.D.<br/>Francis Henry Champneys, M.D.<br/>William Watson Cheyne.<br/>William Munk, M.D.<br/>George Henry Savage, M.D.<br/>H. H. Clutton, M.A.<br/>Frederic S. Eve.<br/>E. Noble Smith.<br/>William Henry Allchin, M.B.<br/>F. G. Dawtrey Drewitt, M.B.<br/>Robert Alex. Gibbons, M.D.</p> <p>1880 David Ferrier, M.D., F.R.S.<br/>Vincent Dormer Harris, M.D.<br/>Edmund D. Maddick.<br/>Jas. John MacWhirter Dunbar, M.B.<br/>James William Browne, M.B.<br/>William Appleton Meredith, M.B.<br/>Alexander Hughes Bennett, M.D.<br/>Malcolm Macdonald McHardy.<br/>Alexander Wm. Macfarlane, M.D.<br/>A. Boyce Barrow.<br/>William Murrell, M.D.<br/>Charles Dennis Hill Drury, M.D.<br/>Charles Cyril Hicks, M.D.<br/>Bernard O'Connor, A.B., M.D.<br/>Leslie Ogilvie, M.B.<br/>George Lockwood Laycock, M.B.<br/>George Ogilvie, M.B.<br/>Charles Edward Beevor, M.B.<br/>Thomas Colcott Fox, M.B.<br/>George Henry Makins.</p> <p>1881 Francis de Havilland Hall, M.D.<br/>Robert Wharry, M.D.<br/>Cecil Yates Biss, M.B.<br/>Richard Clement Lucas.<br/>Stephen Mackenzie, M.D.<br/>James Anderson, M.D.<br/>William Hale White, M.D.<br/>Eustace Smith, M.D.</p> |
|--|--|

## CONTENTS.

	PAGE
List of Officers and Council . . . . .	v
List of Presidents of the Society . . . . .	vi
Referees of Papers . . . . .	vii
Trustees of the Society . . . . .	viii
Library Committee . . . . .	viii
List of Fellows . . . . .	ix
List of Honorary Fellows . . . . .	lxi
List of Resident Fellows, arranged according to Date of Election	lxv
List of Plates . . . . .	lxxiii
Woodcuts . . . . .	lxxiv
Advertisement . . . . .	lxxv
Regulations relative to Proceedings . . . . .	lxxvi

I. On a Case of Aneurism of the External Carotid, in which, after Failure of the Ligature of the Common Carotid, the old operation was successful. By HENRY MORRIS, M.A., M.B., Surgeon to, and Lecturer on Anatomy at, the Middlesex Hospital . . . . . 1

II. A Case of Abscess in the Neck, which in its course destroyed a large portion of the Carotid Artery, Jugular Vein, and Pneumogastric Nerve. By WILLIAM SCOVELL SAVORY, F.R.S., Surgeon to, and Lecturer on Surgery at, St. Bartholomew's Hospital . . . . . 21

III. Amoeboid Movements of the Colourless Blood-corpuscles in Leuchæmia. By JOHN CAVAFY, M.D., F.R.C.P., Assistant-Physician to St. George's Hospital . . . . . 31

	PAGE
IV. On Artificial Respiration in Stillborn Children: the amount of Ventilation secured by different methods. An Experimental Inquiry. By FRANCIS HENRY CHAMPNEYS, M.A., M.B. Oxon., M.R.C.P., F.L.S., Assistant Lecturer on Midwifery, &c., at, and Assistant Obstetric Physician to, St. George's Hospital	41
V. On Artificial Respiration in Stillborn Children, second communication: the Expansibility of various parts of the Lungs. An Experimental Inquiry. By FRANCIS HENRY CHAMPNEYS, M.A., M.B. Oxon., &c.	87
VI. On Hyperpyrexia after "Listerian" Ovariectomy. By GEORGE GRANVILLE BANTOCK, M.D., F.R.C.S. Ed., Surgeon to the Samaritan Free Hospital for Women and Children. (Communicated by JONATHAN HUTCHINSON, F.R.C.S.)	103
VII. One Hundred and Seventy-two Antiseptic Abdominal Sections, with Remarks on the Causes of Death in the Fatal Cases. By J. KNOWSLEY THORNTON, M.B., C.M., Surgeon to the Samaritan Free Hospital	139
VIII. Two Hundred Additional Cases, completing One Thousand Cases of Ovariectomy, with Remarks on Recent Improvements in the Operation. By T. SPENCER WELLS, F.R.C.S., Vice-President of the Royal College of Surgeons; Surgeon to the Queen's Household; Consulting Surgeon to the Samaritan Hospital	167
IX. Further Observations on the Value of Stethometry in the Prognosis of Chest Disease. By ARTHUR RANSOME, M.D., M.A. (Communicated by Dr. W. H. BROADBENT)	185
X. On a Probable Cause of Lead Colic. By C. HILTON FAGGE, M.D., F.R.C.P., Physician to, and Lecturer on Pathology at, Guy's Hospital	219
XI. Experience and Specimens of Ox-aorta Ligature, and some Remarks on the Variability of Catgut. By RICHARD BARWELL, F.R.C.S., Senior Surgeon to the Charing Cross Hospital	225

	PAGE
XII. A Case of Innominate Aneurism treated by Simultaneous Distal Ligature of the Carotid and Subclavian Arteries; with Remarks on the Behaviour of a Tendon Ligature. By CLINTON T. DENT, F.R.C.S., Assistant Surgeon to St. George's Hospital	231
XIII. On the Development of a Layer of Elastic Fibres in Duct Cancer of the Breast. By GEORGE THIN, M.D.	243
XIV. Case of Vascular Protrusion of the Eyeball. By CHAS. HIGGINS, F.R.C.S.E., Ophthalmic Assistant Surgeon to Guy's Hospital	247
XV. Nephrectomy by Lumbar Section. By ARTHUR E. BARKER, F.R.C.S., Assistant Surgeon to, and Assistant Professor of Clinical Surgery at, University College Hospital	257
XVI. An Unusual Case of Warty Growths on the Face. By GEORGE THIN, M.D.	283
XVII. A Case of Urticaria Tuberosa, with unusual Symptoms. By WM. MORRANT BAKER, F.R.C.S., Assistant Surgeon to St. Bartholomew's Hospital, and Senior Surgeon to the Evelina Hospital for Sick Children	289
XVIII. The Immediate Treatment of Fractures of the Leg by Plaster-of-Paris Splints. By JOHN CROFT, F.R.C.S., Surgeon to St. Thomas's Hospital	295
XIX. On the Pathology of Acute Periostitis. By CLINTON T. DENT, F.R.C.S., Assistant Surgeon to St. George's Hospital	307

---

INDEX	319
-------	-----



## LIST OF PLATES.

	PAGE
I. Abscess in the Neck. (Mr. W. S. SAVORY) . . . . .	30
II. Innominate Aneurism: transverse section of artery, showing tendon ligature <i>in situ</i> . (Mr. C. T. DENT) . . . . .	242
III. Ditto. Fig. 1. Elongation of cells, and development of new blood-vessel in the tendon. Fig. 2. Longitudinal section of artery, showing ensheathing lymph and tendon; ligature <i>in situ</i> (twice natural size). (Mr. C. T. DENT) . . . . .	242
IV. Figs. 1—3. Development of a layer of Elastic Fibres in Duct Cancer of the Breast. (Dr. G. THIN) . . . . .	246
V. Warty Growths on the Face, natural size. (Dr. G. THIN) . . . . .	288
VI. Case of Urticaria Tuberosa. (Mr. W. M. BAKER) . . . . .	294
VII—VIII. Acute Periostitis: vertical sections of Periosteum from cases of. (Mr. C. T. DENT) . . . . .	320

---

## DIAGRAMS.

Six Charts [on five Diagrams] of the forward and upward movements of the clavicles and third ribs in Chronic and Acute cases of Phthisis, with exceptional cases and repeated measurements. (A. RANSOME) . . . . .	218
--	-----

---

## WOODCUTS.

Chart of Temperatures in "Listerian" and "Non-Listerian" Ovariectomy. (Dr. G. G. BANTOCK) . . . . .	105
- Warty Growths on the Face. Fig. 1. Microscopical appearance. Vertical section through a growth (Dr. GEO. THIN) . . . . .	287
— Fig. 2. Ditto. Lower part of a Papilla, illustrating the cell-exudation present . . . . .	287



## ADVERTISEMENT.

---

THE Council of the Royal Medical and Chirurgical Society deems it proper to state that the Society does not hold itself in any way responsible for the statements, reasonings, or opinions set forth in the various papers which, on grounds of general merit, are thought worthy of being published in its 'Transactions.'



## REGULATIONS relative to the publication of the 'Proceedings of the Society.'

That, as a general rule, the 'Proceedings' will be issued every two months, subject to variations dependent on the extent of matter to be printed.

That a Copy of the 'Proceedings' will be sent, postage free, to every Fellow of the Society resident in the United Kingdom.

That the 'Proceedings of the Society' may be obtained by non-members at the Society's House, 53, Berners Street, on prepayment of an annual subscription of five shillings, which may be transmitted either by post-office order or in postage-stamps;—this will include the expense of conveyance by post to any part of the United Kingdom; to other places they will be sent, carriage free, through a bookseller, or by post, the receiver paying the foreign charges.

That a notice of every paper will appear in the 'Proceedings.' Authors will be at liberty, on sending their communications, to intimate to the Secretary whether they wish them to appear in the 'Proceedings' *only*, or in the 'Proceedings' and 'Transactions;' and in all cases they will be expected to furnish an Abstract of the communication.

The Abstracts of the papers read will be furnished to the Journals as heretofore.

ON A CASE  
OF  
ANEURISM OF THE EXTERNAL CAROTID,  
IN WHICH,  
AFTER FAILURE OF THE LIGATURE OF THE COMMON  
CAROTID, THE OLD OPERATION WAS SUCCESSFUL.

BY  
HENRY MORRIS, M.A., M.B.,  
SURGEON TO, AND LECTURER ON ANATOMY AT, THE MIDDLESEX HOSPITAL.

---

(Received May 11th—Read October 26th, 1880.)

---

THE first paper in the first volume of the 'Medico-Chirurgical Transactions,' which was read January 29th, 1806, is on "A Case of Aneurism of the Carotid Artery." It is the well-known case of Sir, then Mr., Astley Cooper, in which, on November 1st, 1805, he applied the ligature to the lower part of the common carotid of the right side. The case ended fatally; unfortunately, for this reason amongst others, that the operation of tying the carotid artery was in its infancy, and its application in the treatment of aneurism was then for the first time on its trial. Sir Astley, however, pointed out that the cause of his patient's death "was the inflammation of the aneurismal sac and the parts adjacent, by which the size of the tumour became increased so as to press on the pharynx and prevent deglutition, and upon the larynx so as to

VOL. LXIV. 1

excite violent fits of coughing, and ultimately to impede respiration." But, he continues, "A similar event, however, may be in future prevented by performing the operation when the tumour is small, and pressure has not been made by it upon important parts, or if it is of considerable size, as in this case, *by opening the tumour and discharging the coagulum as soon as the inflammation appears.*"

In the same volume (p. 222) is the account of a second case of carotid aneurism by the same author, in which, in 1808, he tied the left carotid for a smaller aneurism than the first and with good result.

Though it appears from the foregoing quotation that the suggestion of resorting to the old operation for aneurism in cases of aneurism of the carotid arteries was thus made by one of the most renowned Fellows of this Society at its first meeting, I do not find in any volume of the 'Transactions' the report of a case in which the treatment has been adopted. It is well known that Mr. Syme reported in the forty-third and forty-fifth volumes of the 'Medico-Chirurgical Transactions' cases of axillary and iliac aneurisms so treated, and has by his practice and writings recommended a return to the "old operation" in certain cases. Mr. Birkett, too, has in the fiftieth volume described a case of large femoral aneurism which he treated successfully by the old operation, and which I had the good fortune to see him perform.

It is also well known that Mr. Syme in his 'Observations in Clinical Surgery' has related a desperate and, from its attendant consequences, what may even be called a romantic operation, in which he cut into a large traumatic aneurism of the common carotid, and by so doing saved the life of his patient as well as that of his patient's assailant. There are doubtless other cases in which the operation has been done for traumatic carotid aneurism, and Mr. Holmes refers to a successful one by Dr. George E. Frothingham, which is reported in the 'American Journal of Medical Sciences' (October, 1876, p. 433).

The following is an abstract report from the notes of my dressers, Messrs. Harratt and Deane, of a case of spontaneous aneurism of the external carotid :

Elizabeth P—, æt. 45, was admitted, under Mr. Morris, into the Middlesex Hospital, on May 20th, 1879. She had been married sixteen years, and had had two children, one of whom, aged fourteen years, was living. She was an intelligent, healthy, but not robust-looking woman, of good physique and dark complexion ; but she had the worn appearance of recent suffering, and was decidedly lachrymose and nervous in manner. Her thoracic and abdominal viscera were healthy ; but eighteen years ago she had diphtheria, and for several years she had been prone to occasional sore throat. Four years ago she vomited on one occasion a large quantity of blood (her statement being two quarts), and this was followed by a severe illness. Recently her hair has been rapidly coming off, and she has had slight sores on her tongue, and a papular rash on her face, which has now disappeared. There was no existing evidence of syphilis. It was stated by her husband that for a long time past she had been very intemperate, but the relations between them seemed to be such that neither's statements of the other could be taken with entire confidence. She gave the impression of being a well-regulated woman and one superior to her class in life.

*Present illness.*—About eight months ago she noticed a small swelling on the right side in the line of the cervical vessels, and opposite the hyoid bone ; and she some time afterwards became an out-patient under Mr. Clark. The swelling was painful when touched, and also when she turned her head sharply. It increased slightly in size up to eight weeks ago ; since then it has been enlarging more rapidly. It is now about the size of a walnut, pulsatile and expansile, and covered by the edge of the sterno-mastoid muscle. When the chin is in a line with the sternum the swelling can be seen pulsating and the pulsation is completely controlled by pressure on the

common carotid. She complains bitterly of pain all over the right side of her head and neck, and of a distressing feeling of dryness about the throat and fauces. She cannot swallow anything solid without much suffering, and she describes the food as sticking in her throat and requiring a quantity of fluid to wash it down. With the exception of slight hoarseness and a rather whispering tone, there is no difference in her voice, sight, or taste. There is no appreciable difference between the pulsation of the right and left temporal arteries.

During the first part of her stay in the hospital she sometimes complained of the sensation of a swelling on the left side of the neck also, and of the same kind of pain over the left as over the right side of her head; the pulsation of the carotid on this side is very forcible, but no dilatation could be detected.

Several trials were made of digital pressure upon the right common carotid, but these were borne so badly that compressive treatment, excepting under chloroform, was quite out of the question with her. Anodyne ointments, a regulated diet, rest in bed, and grain doses of acetate of lead three times a day, was the treatment adopted.

June 20th.—The tumour was harder, but still pulsated distinctly. She complained of throbbing and pain over the whole front of the neck, and of frequent dryness of the mouth. When the pain was worse the dryness was also worse. The throbbing, which was always most felt by the patient below the right angle of the jaw, was aggravated by lying down, and was then felt as high on the right side as the zygoma.

27th.—All her pain was concentrated in the centre of the right cheek.

July 14th.—Gradually it has become impossible for her to swallow anything solid because of the dryness and pain in her throat. She is very dispirited and sleeps badly; is in constant pain, and often has an unbearable sensation as if her head must burst. The aneurism has not increased much, if at all, in size.

16th.—Chloroform was given at 1 p.m., and the common carotid was tied with a catgut ligature immediately in the line of the omohyoid, the muscle being pulled downwards for the purpose. As soon as the edge of the sterno-mastoid was drawn aside the artery was seen to be greatly distended. All pulsation in the aneurism ceased after tightening the ligature. The ends of the ligature were cut short, the wound was closed by three catgut sutures, and covered with a pad of boracic lint, and over this carbolic gauze. Thirty minims of *Liquor Morphine* were given an hour afterwards. At 5.40 p.m. there was faint pulsation in the right temporal artery, and also in the aneurism, and she was complaining of numbness of the right hand. 6.50 p.m.: pulsation in the aneurism rather more marked. 9.45 p.m.: the numbness of the fingers of the right hand continued; she was in no pain, but complained of soreness of the throat. She had had some quiet sleep. Pulse 93, temp. 99°.

17th (10.50 a.m.).—Had a restless night. Pulsation in tumour very feeble, in the right temporal not very marked. Dryness of throat and numbness of right hand continue. Face flushed; skin hot; tongue moist; very thirsty. Pulse 128, temp. 101.8°. Dressings changed; wound uniting.

18th.—Pulse 114, temp. 100.4°. Right temporal still pulsating feebly. No distinct pulsation in the tumour. Complains of great difficulty in swallowing, and of throbbing pain and dryness in the throat.

20th.—Aneurism pulsates distinctly, but is smaller and harder than before the operation. Wound looks well; the sutures were removed yesterday. A trace of pus escapes from the midpoint. Temp. 99.6°, pulse 96. Complains of headache and difficulty of deglutition.

23rd.—The aneurism still pulsates, and is not quite so hard as it was two days ago; it is about the size of a Kentish cob-nut. Right temporal pulsates distinctly but feebly. Patient is suffering from a severe attack of catarrh, and has a violent pain over the mastoid process of

the right temporal bone. A little discharge escapes from the centre of the incision. In a few days the catarrh and the pain behind the ear had gone. She went on slowly convalescing, but varying from day to day as regards headache, dryness of throat, difficulty of deglutition, and degree of pulsation in the aneurism.

August 12th.—The outline of the aneurism was quite lost, but there was a faint pulsation in the line of the artery in its situation. A sinus leading to the ligature on the carotid was daily discharging a bead or two of pus, sometimes blood-stained.

18th.—The patient detected blood trickling from the sinus; about ʒj escaped; it was readily checked by cold-water dressing. The blood was supposed to come from the florid and exuberant granulations which lined and surmounted the orifice of the sinus. A lotion of chloride of zinc (gr. ij ad ʒj) was ordered to be applied.

25th.—There has been daily since last note a deeply blood-stained discharge from the sinus, and last night about ʒij of blood escaped. The granulations around the orifice of the sinus form a small fungous tumour. Chloride of zinc lotion still applied.

September 11th.—A small, hard, flattish lump marks the seat of the aneurism, and is very tender on pressure. The patient is again suffering from shooting pains along the neck and right side of the head. The sinus still discharges a little blood-stained pus. There is pulsation on the distal side of the ligature as low down as the upper part of the cicatrix.

She leaves the hospital to-day as it is thought change of air may hasten the healing of the sinus.

After this she came once a week to see me, each time complaining of considerable and widespread pain, like that she suffered before the operation, and the lump above described was increasing in size, but did not pulsate.

October 11th.—She described the pain on the right side of her head and neck as maddening and unbearable, and she felt weak and dejected. The swelling at the angle of

the jaw did not pulsate, but had increased in size and extended both upwards and backwards. It was very tender. About this time she was seen by Mr. Christopher Heath who kindly communicated with me about the case. As he very justly remarked, the condition of the neck as he saw it suggested the idea of a malignant tumour, and this view would, I think, have been taken by any one who had not known the previous course of the case.

16th.—She went to Eastbourne, and whilst there slept for two nights exposed to a draught; then the swelling increased considerably and the pain became even more severe. She returned home on October the 22nd in a very critical and exhausted state. There was still a little discharge from the sinus. The skin over the tumour had become red and cedematous, but no fluctuation or pulsation could be detected; the pain was never ceasing, and deglutition, even swallowing saliva, was difficult. Remedies failing to relieve her, or diminish the inflammation, Mr. Hulke concurred with me in thinking that pus, though deeply seated, had formed and that an exploratory incision was demanded. Further, if it was found that the sac of the aneurism was so far involved that blood-clot or fluid blood escaped from it, it was decided that the aneurism should be freely laid open and the vessels tied. On the 30th, therefore, ether was given and an incision two and a half inches long was made through the brawny cedematous skin, and a small incision into the deeper tissues, whereupon pus oozed up into the opening; dressing forceps were introduced and withdrawn expanded, and more pus escaped; warm lead poultices were then applied over the swelling. For some days after this the pain ceased, and the swelling rapidly subsided, though a good deal of induration remained below the angle of the jaw. The quantity of pus discharged altogether was not large. Her constitutional condition greatly improved, indeed became very good, and the old sinus in the original wound had finally closed by November 2nd.

November 14th.—The recent incision has healed with



the exception of a sinus surmounted with fungus granulations and constantly discharging a little blood-stained matter, very much resembling that which had existed so long in the first wound. Along the front of and above what remained of the swelling there was very distinct pulsation, yet the patient was free of pain and described herself as altogether better than she had been for a very long time past. But this improvement was not to last. The next day the pain returned and subsequently recurred at short intervals.

December 3rd.—After sitting up for a short time a little bleeding took place from the sinus, and again a little more at 2 a.m. December 4th. Some hours later the headache and pain in the neck were as severe as ever, and from this time the swelling rapidly increased again, and continued to pulsate—the pulsation being expansile, while the skin over it became red and œdematous once more.

5th.—I sought a consultation with all my surgical colleagues as to the necessity of laying open the sac of the aneurism. It was decided that the application of ice and the administration of morphia should be tried for twenty-four hours longer, and that then, if no improvement had taken place, the operation should be undertaken. The next day, however, the operation was again delayed, as it was thought the tumour was somewhat harder. It seemed to me, however, that the swelling had extended further beneath the jaw, and the pulsation both in front and behind the line of the upper cicatrix was very marked.

7th.—It was clear the aneurism was still growing, the superficial tissues becoming more tense, and that, in addition to her sufferings and inability to take food, the patient stood in imminent risk of severe and even fatal hæmorrhage at any moment. Accordingly, at 3 o'clock in the afternoon, and with the full concurrence and assistance of my colleagues, I made an incision three inches long over the aneurism through a considerable

thickness of condensed, brawny, and infiltrated tissues, which were very vascular and bled readily. At one spot soft black blood-clot, continuous with the clot in the sac, reached up very nearly to the surface. A second short incision was then made upwards and forwards from the first, so as to get to the front of the sac, and the facial artery, being thus found running off from the aneurism, was secured with a catgut ligature. Search was next made a little lower down, and a second vessel, probably the common trunk of the lingual and superior thyroid, also springing from the inner side of the sac, was treated similarly. The blood-clot was now turned out of the aneurism, and at once there escaped large gushes of arterial blood, which, with the help of Mr. Hulke and Mr. Lyell, was controlled by digital pressure. It soon became evident that this blood flow, which was profuse and in a large stream as soon as the pressure was relaxed, came from the upper end of the aneurism chiefly. A tenaculum was made to fix and raise this part of the sac and had the effect of stopping the bleeding. Two or three attempts to apply a catgut ligature around the vessel above the sac failed, until the incision was prolonged upwards above the level of the angle of the jaw. I had wished to avoid this, for owing to the state of the tissues it was quite impossible to distinguish one structure from another. In doing so I cut across a vein, to which I applied a pair of torsi-pressure forceps, and an artery which was torsioned; this was probably the occipital. It was now easy to apply a silk ligature above the sac, and to remove the tenaculum without further hæmorrhage. A probe was passed down from the sac into the common carotid for a short distance as far as it was pervious. The internal carotid was not seen during the operation, but it was evident that no blood was arriving at its lower end. The torsi-pressure forceps and the end of the ligature were left hanging from the upper part of the wound, the wound was brought together with two or three sutures, and a drainage tube was inserted at its lower end. The next day the temperature

was  $101.6^{\circ}$  and the pulse 130; she had passed a fairly good night. The tongue was protruded towards the left side. The torsi-pressure forceps were removed.

From this time all went well; the sutures were removed on the second day, and the ligature on the seventeenth day, and she was allowed to sit up in bed on the eighteenth day after the operation. Then convalescence was retarded by a severe attack of quinsy, excited, in all probability, by the thick fog of Christmas day, irritating a part which had for years been prone to disease, or possibly, as she herself thought, by a draught felt during the temporary removal of her bed screen. The right tonsil suppurated and burst; the left recovered by resolution. By January 18th, she had recovered from the quinsy, a week later she was allowed to leave her bed, and on the 10th of February the note runs: "Is getting stronger daily, and feels well. There is very little induration about the cicatrix." On February 12th she was discharged well.<sup>1</sup>

*Remarks.*—The difficulty, admittedly great, of deciding whether an aneurism, situated just above the bifurcation of the common carotid, involves the internal or external carotid was in this case cleared away by the operation. From the absence of pulsation in the pharynx, and from the want of any evidence of pressure upon the jugular vein, there was an inference that the external carotid was the seat of the disease. This inference was confirmed at the operation.

It should be remarked that the catgut ligature effected the complete and permanent closure of the common carotid. Not only was the vessel just above the ligature impervious at the time of the last operation, but never after the application of the ligature did the pulsation on the distal side extend lower than the upper end of the original cicatrix *i.e.*  $1\frac{1}{4}$  inch at least above the liga-

<sup>1</sup> May, 1881.—The patient was shown at the Society's meeting in October, 1880. Since then I have seen her two or three times; she is remaining quite well.

ture. The return of pulsation in the sac a few hours after applying the ligature; the slow consolidation of the aneurism; the feeble pulsation in the vessel on the proximal side of it, but its entire absence immediately above the ligature; the subsequent growth of the aneurism in spite of the complete obliteration of the main vessel; and the violent hæmorrhage, at the last operation, from the orifice of the distal side of the sac, together with the absence of any bleeding at the lower part of the internal carotid prove how important a part the anastomotic circulation of the external carotid plays in aneurisms of the carotid near the bifurcation of the common trunk. So direct is the communication between the branches of the right and left external carotids, and between some of these branches and other vessels on their own side; so quickly is the full anastomosis established; so large is the quantity of blood which may be thus brought to the aneurism by branches springing close to, if not absolutely from, the sac; and so confused must be the whirl, within the sac of an aneurism of the external carotid, of the blood thus reaching it in so many directions, that I think *it would be best in carotid aneurisms near the bifurcation of the common trunk to ligature simultaneously the common carotid and such branches of the external carotid as are easily accessible, viz. the facial, superior thyroid, and lingual, which may all be reached through one oblique incision; and the temporal.*

Whether the aneurism be of the external or internal carotid this proceeding would be safer and simpler than the old operation; and it may be justly inferred from Mr. Porter's and Mr. Syme's cases that the force of the reflux of blood through the branches of the external carotid is sufficient to produce pulsation in aneurisms of the internal carotid as well as of the external.

The return of pulsation in these aneurisms after the application of a ligature to the common carotid has been usually attributed to the anastomosis of the internal carotid within the skull; and it has been said that this

anastomosis is not only much freer than in the external carotid, but that it is "*capable of still conveying the impulse of the heart.*" The answer to this is, I think, that if this be so why is it, considering the size of the internal carotid where it forms part of the circle of Willis, that the pulsation does not return in the aneurism within a few minutes, or why does it ever cease? and why is it that after the common carotid has been tied some time the internal carotid in the neck and in its petrous part right up to the origin of the ophthalmic artery has been found occluded; whilst the external carotid with all, or some, of its branches has been found pervious?<sup>1</sup>

The conditions of the circulation in the carotids after ligature of the common trunk are peculiar, and differ from those in other vessels after ligature of a main artery. For instance, in the case of the femoral artery the blood which is brought into the vessel beyond the ligature diffuses itself through the capillaries and into the veins. But, after ligature of the common carotid, blood rapidly reaches the external carotid by its terminal as well as its proximal branches, and is thus running away from the capillaries towards the parent trunk. What, therefore, is to become of it if it meet at the bifurcation of the common carotid with a strong reflux current down the internal carotid? If there be no such reflux, in time, the circulation will adapt itself to circumstances whether the internal carotid is closed or not. Again, it is more in accordance with the requirements of the several parts to suppose, if there be a through channel maintained from one primary branch to

<sup>1</sup> See the post-mortem report of Sir Astley Cooper's second case in 'Guy's Hospital Reports,' vol. i, p. 53; of Mr. Porter's case of "Aneurism of the External Carotid in the Neck," in Porter's treatise 'On Aneurism,' p. 153 and of Mr. Syme's case of "External Aneurism of the Internal Carotid," in 'Lond. and Edin. Monthly Journal,' November, 1842. See also the beautifully injected preparation in the Hunterian Museum of Mr. Heath's case, showing the carotid vessels some years after ligature of the carotid trunk; the common carotid is obliterated, but all the branches of the external carotid are patent, and some of them much enlarged.

the other, that the direction of the current would be from the external to the internal carotid instead of the reverse. The parts supplied by the external carotid can at once be nourished by the anastomoses of the external vessel without drawing off blood from the circle of Willis; besides, the blood reaches the circle of Willis under conditions which prevent any significant degree of compensatory enlargement of the vessels on their way to it.

The second case of Sir Astley Cooper, referred to above, has several points of resemblance to the case of Elizabeth P—. 1. The situation of the aneurism just above the bifurcation of the common trunk. 2. The symptoms before the application of the ligature. 3. The delay in the healing of the wound where the ligature was applied, owing to the existence of a sinus and the fungus granulations around it.<sup>1</sup> 4. The continuance of pulsation in the aneurism for several weeks after ligation of the common carotid.

Sir Astley considered the pulsation "to be the effect of the return of blood by the internal carotid artery from the brain." After expressing his opinion that the aneurism was seated in the internal carotid artery, he goes on to say: "And this led me to hope that the regurgitation of the blood, although at first sufficient to produce a slight pulsation in the tumour, would not continue to support its growth, because as the internal carotid passes through a foramen in the skull a little above the swelling, it could not dilate at that part to bring down any additional quantity of blood into the sac; so that its first effect was likely to be as great as any it could produce. But if the aneurism had been of the external carotid artery, owing to the number of communicating vessels, I should not have been equally sanguine in my expectation that the pulsation would have ceased, as I have known two instances, one of a wounded radial

<sup>1</sup> This was observed in many cases: it occurred in Lyford's, Coates', and Vincent's; and in Post's, of New York, quoted by Hodgson in his work on 'Diseases of the Arteries.'

artery, and the other of aneurism of the anterior tibial, in which the tumour continued to grow by anastomosis after the arteries had been tied above the swellings." But if I may say so without being thought too presumptuous, I think it is doubtful whether the aneurism in Sir Astley's patient was of the internal and not of the external carotid; and that his explanation of the recurrence of pulsation in it is not the most probable. There is the authority of Mr. Holmes for saying that "no trustworthy diagnostic sign has been pointed out by which it can be determined whether the aneurism is seated on the internal or external carotid or one of the branches of the external carotid artery." Sir Astley's patient lived for thirteen years after the operation, and the post-mortem examination ('Guy's Hospital Reports,' vol. i, p. 53) by no means disfavours the view that the aneurism was in the *external* carotid. Moreover, in the clinical report of this case it is noted about a month after the operation that "the facial and temporal arteries on the left side (the side of the aneurism) cannot be felt;" and eight months later the same absence of pulsation in them was observed. Now, from the rapidity with which pulsation often returns in the temporal artery after ligation of the common carotid, and from the fact that the absence of pulsation in the facial and temporal arteries of this patient is not mentioned until the date at which the pulsation in the aneurism "was with difficulty perceived," I venture to think that the return of the pulsation in the sac was due to the anastomosis of the branches of the external artery,<sup>1</sup> that

<sup>1</sup> In the discussion which followed the reading of this paper, Dr. Hilton Fagge referred to an unpublished case, which had come under observation at Guy's Hospital, and which he thought confirmed my opinion with regard to the collateral circulation after ligation of the common carotid. The case was that of a patient who was admitted with aneurism of the internal carotid and aphasia; the common carotid was tied, and the aphasia, which had existed for some days, passed off. The conclusion was, that before the application of the ligature the pressure of the aneurism, which was of the sacculated form, prevented blood finding its way through the internal carotid to the brain; but that after its application the aneurism contracted, pressure was relieved, the

the temporal and facial arteries became obliterated by extension of clot from the aneurism, and that this extension of clot into these vessels was a most important factor in the cure of the aneurism.

It seems to me that the absence in my case of any bleeding from the internal carotid at the time of laying open the aneurism, together with the fact that there was no extension of clot from the common into the internal carotid artery, throws considerable doubt upon the possibility of the anastomosing flow of blood through the arteries within the skull *ever reaching as low down as the origin of the internal carotid in the neck*. Again, in Sir Astley Cooper's case it was found at the post mortem that only about half an inch, and that the cerebral part of the internal carotid, was pervious, while the superior thyroid and the commencement of the external carotid was filled with injection from the arteries of the opposite side; but why, if the anastomosing current had kept open the superior thyroid for so many years, should the flow round the circle of Willis (the vessels of which on the aneurismal side were widely dilated and larger than those on the other side) have maintained a channel along only half an inch of the internal carotid of the affected side. Haller's case, quoted in Hodgson's treatise (p. 314), as well as those of Syme and Porter before alluded to, shows also that the internal carotid is contracted into a slender cord as far as the petrous canal, while into the external carotid the clot extended no further than to the "origin of the labial artery." I may also refer to a case under Mr. Poland's care, in which, when house-surgeon at Guy's Hospital, I had to tie the common carotid artery for violent hæmorrhage from an abscess in the neck. The patient died fifty hours after the ligature had been applied, and at the post-mortem examination the internal carotid where it formed part of the circle of Willis was plugged by ante-mortem clot.

channel of the artery was again open, and the anastomosing circulation by the branches of the external carotid brought the blood again to the affected side of the brain through the internal carotid.



A case which seems to support the same view, viz. that blood does not arrive in the cervical part of the internal carotid from the circle of Willis, is recorded in Joseph Hodgson's work on the 'Disease of the Arteries' (pp. 335 *et seq.*). A man was gored by a cow; the internal carotid and all the primary branches in front of the external carotid were lacerated; bleeding was not immediate, but it came on some time afterwards. Mr. Abernethy tied the common carotid, and the bleeding was stayed. The man died, however, in thirty hours from other causes, and it was found that the internal carotid was torn across, and the superior thyroid, facial and lingual were torn off from the trunk. It is fair to suppose that thirty hours was not sufficient for the anastomoses to be established through the branches of the external carotid after the collapse and hæmorrhage of the accident, but this can hardly be thought of a vessel the size of the internal carotid, which itself forms part of the circle of Willis. Surely here was an opportunity of blood escaping at the lower end of the upper fragment of the artery from the cerebral vessels, almost as easily as from the upper end of the lower segment direct from the heart. But it was not so. Guthrie, in a clinical lecture in the 'Lancet' (vol. ii, 1850, p. 143), quotes a case which, whilst it shows the importance of the collateral circulation of the superior thyroid branch of the external carotid, suggests the absence of any reflux along the internal carotid trunk. "During an operation at Westminster Hospital the external carotid was opened a little above its bifurcation. A ligature was placed upon the common carotid; the bleeding was not in the least arrested. A ligature was then placed upon the external carotid above the hole in the artery, which still continued to pour out blood. *A third ligature was placed upon the internal carotid without success.* A fourth ligature was then applied on the external carotid below the hole in it, including the superior thyroid, after which the bleeding ceased and never returned." In Case 123, also referred to in the same

lecture, the internal carotid throughout nearly its whole length was empty, and Guthrie supposed that a "ligature on the external carotid might have been sufficient"—the common carotid having been previously ligatured.

And if it were the case that blood can escape from the skull along the internal carotid after the ligation or other occlusion of the common carotid, would not the additional deprivation to which the brain would be thus subjected tend to produce cerebral softening more often than we find it following the application of the ligature to the trunk vessel? For then not only would one quarter of the whole supply to the brain be cut off, but more than this, by as much as escaped down the internal carotid. The effect of injections after death are not reliable in reference to this question, because the force of the injection and the difficulty of escape of the fluid by the capillaries into the veins of the brain, which are full of blood, would assist the flow into any large and empty tube, even though it ran off a nearly horizontal plane to take the zigzag course of the upper end of the internal carotid.

Further, it ought to be borne in mind that in the living subject there is a strong *vis-a-fronte* force at work to draw blood off from the circle of Willis into the brain substance and its membrane, as well as into the orbit and to the eye; whereas there is an almost complete absence of anything like capillary attraction at work on the internal carotid as it passes through the petrous bone and along the neck.

With reference to the treatment of aneurisms of the carotid near the bifurcation, however, it must be admitted that whether Sir Astley's case was one of aneurism of the external or internal carotid, the result of the case gives some encouragement to the employment of the ligature on the common carotid alone. And Mr. Porter's case does the same in aneurism of the internal carotid. But it should be borne in mind that Sir Astley's did not recover until the facial and temporal arteries became plugged; and the perusal of Mr. Porter's successful case, as given

in more detail in the fifth volume of the 'Dublin Hospital Reports,' leads one to the opinion that the patient had a very narrow escape from suppuration of the sac, and that it was the pressure of the tumour upon the external carotid and its branches, which finally worked the cure of the aneurism.

I therefore cannot help coming to the conclusion that in all such cases the chances of success of the ligature of the common carotid will be much increased if we cut off at the same time the collateral circulation through the branches of the external carotid; and that if this be not done there is a very great probability that after a short time the aneurism will again begin to grow and set up the chain of serious consequences witnessed in the case just related, and in others alluded to in this paper, and which nothing but the operation of Antyllus is sufficient to overcome.

Perhaps to some it may seem uncertain whether Sir A. Cooper, in recommending that the tumour should be opened, and the coagulum discharged as soon as inflammation appears, had in view the old operation, or only a means of relieving the more urgent symptoms of local inflammation.

But the mere incision for the discharge of coagula into an inflamed aneurism which has been treated by the proximal ligature, makes no provision against the effects of collateral circulation, and of the hæmorrhage which is likely to occur from the vessels on the distal side of the sac.

In a case reported by Mr. Vincent in the tenth volume of the Society's 'Transactions,' in which inflammation occurred round an aneurism at the bifurcation of the right carotid, we find that death followed immediately the incision of the aneurism, though the artery below the ligature was completely obliterated. Again, in Mr. Coates's case, reported in the eleventh volume of the 'Med.-Chir. Trans.,' an aneurism of enormous size, which probably commenced in the external carotid, was incised for suppuration of the sac, and the man died after repeated severe hæmorrhages; the

ligature had occluded the artery, which "seemed to be converted into a solid incompressible substance," and at the post-mortem examination an artery, almost certainly the facial, was divided in detaching the skin from the lower maxilla; this artery "readily received a probe, which passed into the cavity of the sac." Mr. Coates in reviewing the circumstances of his case, came to the conclusion that in a similar one he would open the sac earlier, and gives his reason for doing so in the following words: "For it appears that the coagula produced the severe symptoms of local inflammation, which caused the enlargement of the anastomosing vessels, and subsequent hæmorrhage." Not a word about the possibility of the anastomoses having been established prior to the inflammation, as the result of the aneurism itself, or of the ligature used for its cure. Not a word about the necessity of taking steps to prevent distal hæmorrhage after turning out the clot. Yet, after carefully reading his case, one cannot resist the conclusion that had ligatures been applied above the sac, and to the branches communicating with it, at the same time as, or even within some days after the incision of the aneurism, the life of his patient might possibly have been spared.

Mr. W. H. Porter ('Treatise on Aneurism,' p. 154) describes a very melancholy case in which after ligature of the common carotid very low down, and suppuration of the sac, he made a free incision into the tumour "with a view to discharge the matter, turn out all coagula, and then by applying pressure externally seek the obliteration of the sac." Though he thought there was "no cause for apprehension beyond the wearing and wasting hectic that would probably be established," the man bled to death. On examining the cavity at the time of the first hæmorrhage he saw "several streams of arterial blood passing in different directions through a broken clot at the bottom of the sac," and his impression was that "*some branches opened into and communicated with the cavity.*"

In further illustration of the importance of the collateral

circulation in carotid aneurisms, though from a negative point of view, another historical case may be referred to, viz. that recorded by Wardrop in the thirteenth volume of the 'Med.-Chir. Trans.,' in which he first applied the *distal* ligature for a carotid aneurism. In this patient, a woman, aged seventy-five years, the skin over the aneurism ulcerated and a quantity of clot was discharged, but she recovered without having any active hæmorrhage whatever.

It is not too much to suppose, had there been no ligature on the distal side of the aneurism, *even though the vessel on its proximal side was entirely occluded*, that the same fatal hæmorrhages would have followed the ulceration in Wardrop's case as followed the incision in Coates's and Porter's and Vincent's cases.

It was by stopping the flow of blood into the distal side of the aneurism that Elizabeth's P—'s recovery was ultimately obtained; and by not doing so at the time when the common carotid was ligatured, that the subsequent growth of the aneurism was possible. For these and other reasons stated in the text, I should be disposed, if a similar case presented itself to me, to ligature the accessible branches of the external carotid at the same time that I applied the ligature to the common carotid itself.

# A CASE OF ABSCESS IN THE NECK,

WHICH IN ITS COURSE

DESTROYED A LARGE PORTION OF THE CAROTID  
ARTERY, JUGULAR VEIN, AND PNEUMO-  
GASTRIC NERVE.

BY

WILLIAM SCOVELL SAVORY, F.R.S.,  
SURGEON TO, AND LECTURER ON SURGERY AT, ST. BARTHOLOMEW'S  
HOSPITAL.

---

(Received September 30th—Read October 26th, 1880.)

---

SEVERAL instances of abscesses which in their progress have laid open important vessels have been recorded, but in the case I propose to relate, not only was a considerable portion of the common carotid artery thus destroyed, but also a still larger portion of the internal jugular vein, and a large part of the pneumogastric nerve. I can find no record of such destruction by an abscess as this.

But as even cases in which an abscess in its course has laid open a single large vessel are not of frequent occurrence, I may perhaps be allowed in passing to mention the two following instances, which, as it were, lead up to the principal one.

In the first of these two cases the internal jugular vein was laid open.

Mary Anne Compton, æt. 2, was brought to the surgery

of the hospital on the 10th of February, 1879, with a large abscess in the neck on the left side, below the angle of the jaw, stated to be of a week's duration.

A small incision was made a short distance below and external to the mastoid process. A few drops of pus first escaped, then some blood-clot, followed by a gush of dark blood.

A pad and bandage were applied and some brandy given to restore the child who was very faint and blanched.

On the 12th the child was better, but still very pale. It took food freely; temp.  $103^{\circ}$ . The wound was dressed; a little dark serum escaped from the orifice.

On the next day—the 13th—the skin around the wound over an area as large as a sixpenny piece had sloughed. The orifice was filled up by blood clot.

At noon hæmorrhage recurred to a small amount; chloroform was given, and then the abscess was laid open freely. The blood-clots which filled the cavity were turned out, and a gush of blood came from the upper part. This was distinctly seen to issue from the internal jugular vein, but the orifice could not be secured. A graduated compress was applied. The child sank two or three hours after the operation.

*Post mortem.*—The abscess occupied the upper and greater part of the posterior triangle of the neck and extended beneath the upper portion of the sterno-mastoid muscle where the great jugular vein was exposed. The glands in the neighbourhood were much enlarged, some of them suppurating.

Around the upper part of the jugular vein there was considerable inflammatory thickening of the cellular tissue, involving also the pneumogastric nerve, but not the artery. The outer and front aspect of the jugular vein formed part of the wall of the abscess, and an opening was found in the vessel about an inch below its exit from the skull. The orifice had been formed apparently by ulceration of the wall; the edges were ragged and somewhat infiltrated. It measured about two thirds of an inch from above

downwards, and two lines across. Only this spot in the vein had suffered. The coats of the vessel elsewhere, even close to the margins of the aperture, and the internal surface were healthy. No clots were found in the adjacent portions of the vein.<sup>1</sup>

In the second case the femoral artery and vein were laid open.

March Smith, æt. 36, fair and muscular, a railway clerk, was admitted into the hospital on December 4th, 1877. In the previous March he contracted gonorrhœa, which was followed by inflammation of the right inguinal glands. This gradually increased, until at length the skin ulcerated and matter had been freely discharged. But he was able throughout to follow his occupation, and gave up work only on the 29th of November, in consequence of a discharge of blood from the openings. Hæmorrhage recurred on the 1st, 2nd, 3rd, and 4th of December. The loss of blood had evidently been considerable. The surface was blanched, the pulse very soft and rapid. Temp. 101·6°. He was restless; almost delirious.

Scarpa's triangle on the right side was filled up by an ill-defined mass of inflamed tissue, in some parts much indurated, in others boggy, in a state of suppuration. The skin over it was very brawny and of a dusky red. There were three sharply-cut openings, each about the size of a sixpenny piece. The bases were level and formed by firm blood-clot. One was about an inch below Poupart's ligament, internal to the vessels. The other two lay in the same horizontal line, and were an inch lower down. The outermost of these was directly over the femoral artery.

The swelling had a clearly distensile pulsation, but there was no decrease of size when pulsation was stopped by pressure on the artery above. A systolic bruit was audible over it. The pulsation in the vessels below was weaker than on the opposite side.

Soon after his admission the external iliac artery was

<sup>1</sup> The preparation is in the museum of St. Bartholomew's Hospital. See Series 13, No. 202.



tied, but the patient never rallied and died of exhaustion a few hours afterwards.

*Post mortem.*—The orifices above described were the outlets of an abscess cavity, the size of a small orange, formed in the midst of dense fibrous tissues, in the outer portion of which were numerous enlarged glands. The central portion of the cavity was filled by fresh black clot, while its wall was lined by firm laminated and partly decolorised fibrine. Through the floor of this abscess, and in contact with its wall, the great vessels passed. About an inch of the common femoral artery, and an inch of the superficial and profunda arteries, and a corresponding portion of the veins traversed the cavity.

The femoral vein was partly destroyed, so that shortly after it entered the abscess from below it terminated abruptly as if it had been cut across. No clot occupied the canal. About an inch of the tube had been completely destroyed. The upper end was also transversely divided, but here the canal was completely filled and distended by a firm blood-clot, which passed for three or four inches into the external iliac vein.

An opening was found on the inner side of the superficial femoral artery, a quarter of an inch below the origin of the profunda, large enough to admit a goose quill, with ragged edges. Just below this was a second orifice, linear, from one and a half to two lines long. The external coat of the artery had been dissected up by the disease. This was most evident at the upper part where a portion of the outer coat had been raised from the artery till the separation nearly reached the abscess wall. A fragment of the coat was thus left hanging free from the vessel.<sup>1</sup>

No disease was discovered elsewhere in the arterial system.

But the case to which I wish especially to call attention is the following one :

Charles Dungate, æt. 31, a house-keeper at the Old

<sup>1</sup> Museum of St. Bartholomew's Hospital, Series 13, No. 204.

Bailey, was brought to the hospital on the 23rd of last March in a state of extreme prostration from hæmorrhage. He could not tell his own story ; but the account brought with him was to the effect that for two years he had had a " lump " on the left side of the neck. This appears to have given him very little concern until three days previously, when it suddenly " burst out bleeding." The hæmorrhage was at once controlled with a pad and bandage by a medical man who happened at the time to be in the house on a visit to his wife. On each succeeding day the hæmorrhage had been renewed copiously.

On admission, at 3 p.m., he was carried at once into the operating theatre and, after administration of chloroform, the pads were cautiously removed. Presently a gush of blood came from a large orifice which would easily admit a finger into a considerable cavity filled with clot, at the lower part of the neck on the left side, behind the sterno-mastoid muscle.

Hæmorrhage being controlled with great difficulty by pressure, the opening was enlarged down to the clavicle and somewhat forward by the division of a few of the posterior fibres of the sterno-mastoid. The finger could then be passed behind the muscle, some way upward and a long way downward, in the course of the vessels behind the clavicle. The examination was necessarily hasty and imperfect, for, on the least remission of pressure, hæmorrhage was furious and the man was in imminent danger of dying on the spot. It was supposed that the large cavity was either that of an aneurism or an abscess and as no bleeding orifice could be seen, and there was no space below for the application of a ligature, the cavity was plugged with strips of lint soaked in a solution of perchloride of iron ; graduated compresses of lint were applied over it, and the man, who was blanched and exhausted to the last degree, was allowed to remain on the table without disturbance and carefully watched. At 8 o'clock—five hours afterwards—he had so far rallied that he was removed to bed in the adjacent ward.

At 3.30 p.m.—Temp.  $102^{\circ}$ , pulse 168, very soft, but of fair volume.

6 p.m.—Temp.  $103^{\circ}$ , pulse 148, improving in power.

10 p.m.—Temp.  $99^{\circ}$ , pulse 138.

He sweated profusely during the evening and then became conscious. He had taken much milk and brandy since the operation. A sixth of a grain of morphia was injected and he slept fairly well during the night.

March 24th.—10 a.m.—Temp.  $100.6^{\circ}$ . No return of hæmorrhage.

8 p.m.—Temp.  $100^{\circ}$ , pulse 120, soft and regular. Restless. Occasional hiccough. Quite conscious during the day.

25th.—10 a.m.—Temp.  $99^{\circ}$ , pulse 120, equal in the two wrists. No pulse in left facial and superficial temporal arteries. Slept well. Very pale, sallow, and feeble. Slight hiccough. Urine, sp. gr. 1028, acid; loaded with albumen; urates abundant.

8 p.m.—Temp.  $100^{\circ}$ , pulse 140. Restless.

26th.—Temp.  $100.4^{\circ}$ , pulse 146. Still hiccough. Complained frequently, by pointing, of pain in the neck. Repeated injections of morphia. He took fluid food freely.

27th.—Temp.  $100.8^{\circ}$ , pulse 144. Urine still highly albuminous. At 11 p.m. he died. There had been no further hæmorrhage.

*Post-mortem.*—Body very lean. Skin sallow. No abnormal appearances were noticed in the skull or its contents. Vessels pervious and healthy.

In the neck, on the left side, was a large cavity, external to the sterno-mastoid muscle. This extended from the cricoid cartilage down to the subclavian artery but the vessel was not involved and was healthy.

On dissection, many of the glands of the neck on the left side were found enlarged. Those in the neighbourhood of the cavity were matted to its walls. The common carotid artery entered the cavity from below and terminated one inch and a half from its entrance by a ragged orifice; the

whole calibre of the vessel for about one and a half or two inches having been completely destroyed. The upper end of the artery, about two inches distant, free like the lower, terminated in the cavity by a similar orifice. Both orifices were closed by firm clot.

A portion of the whole calibre of the internal jugular vein was also destroyed, but to a greater extent than the artery. Its upper extremity lay just within the cavity and was firmly closed. The lower extremity could not be clearly defined. The vessels showed no sign of dilatation either within or without the cavity.

The left subclavian and innominate veins appeared to be in part blended with the lower wall of the cavity. All along the line of contact they were impervious; closed by a fibrous tissue.

A large portion of the pneumogastric nerve was also destroyed in its course through the cavity. The two ends of the nerve were found free in the upper and lower part, a portion of the nerve from one to one and a half inches in length being wanting.

The wall of the cavity was from one to two lines in thickness. Its inner surface was very rough and in part irregular. In structure it resembled the wall of an abscess. It had not the characters of any portion of the wall of an artery. Moreover, on dissection, it was evident that there was nowhere direct continuity of structure between the wall of the cavity and that of the artery. In fact, in the preparation they are still shown to be quite distinct.<sup>1</sup> And the portion of artery within the sac possessed all its tissues. (See Plate I.)

At two spots the front of the heart adhered by fibrous tissue to the pericardium. No signs of recent pericarditis. Clots in the heart and vessels voluminous. Muscular substance and valves natural. The aorta just above and in the arch was studded with small atheromatous elevations. In the rest of its course the vessel was tolerably healthy.

<sup>1</sup> In the museum of St. Bartholomew's Hospital, Series 13, No. 210.

Left lung: a small quantity of serous effusion in the pleural cavity without signs of inflammation. Numerous small petechiæ over the visceral pleura. Lung tissue œdematous.

Right lung: some small flakes of recent lymph were found between the lobes. No effusion. Several scattered patches of pneumonia (grey hepatisation) in the upper lobes towards the front.

Liver healthy. Spleen soft and large.

Kidneys congested; rather large. Slight increase of their fibrous tissue. Supra-renal capsules normal.

Stomach and intestines healthy.

Such complete destruction of so large a portion of the artery, vein and nerve, must surely have been the work of at least some, probably of many days, perhaps of some weeks, and yet up to the period of the first hæmorrhage the man appears to have been free from any great amount of distress, and to have been even able to follow his occupation. Neither during life nor after death was there any evidence that the brain materially suffered from the inevitable disturbance of its circulation. Nor was the destruction of the pneumogastric nerve followed by any very obvious effect. During the last two or three days of life the pulse was noted to have been very rapid, but that may be otherwise well explained. The respiration was not remarkably embarrassed, and the left lung, after death, presented no characters that could be especially associated with the lesion of the nerve, certainly none in striking contrast to the right. The absence of more marked and unequivocal effects may perhaps be, in some measure, attributed to the gradual destruction of the nerve; but even in experiments (see those, *e.g.* of Dr. Reid<sup>1</sup>) where the influence of one nerve has been suddenly

<sup>1</sup> From numerous experiments Dr. Reid concluded "That lesion of one of the pneumogastrics does not necessarily or even generally induce disease of the lung of that side;" and this he explained by the free anastomoses between the pulmonary plexuses of the two sides.—'Edinburgh Medical and Surgical Journal,' vol xlix, p. 159.

cut off, the corresponding lung has not always shown the changes which usually follow.

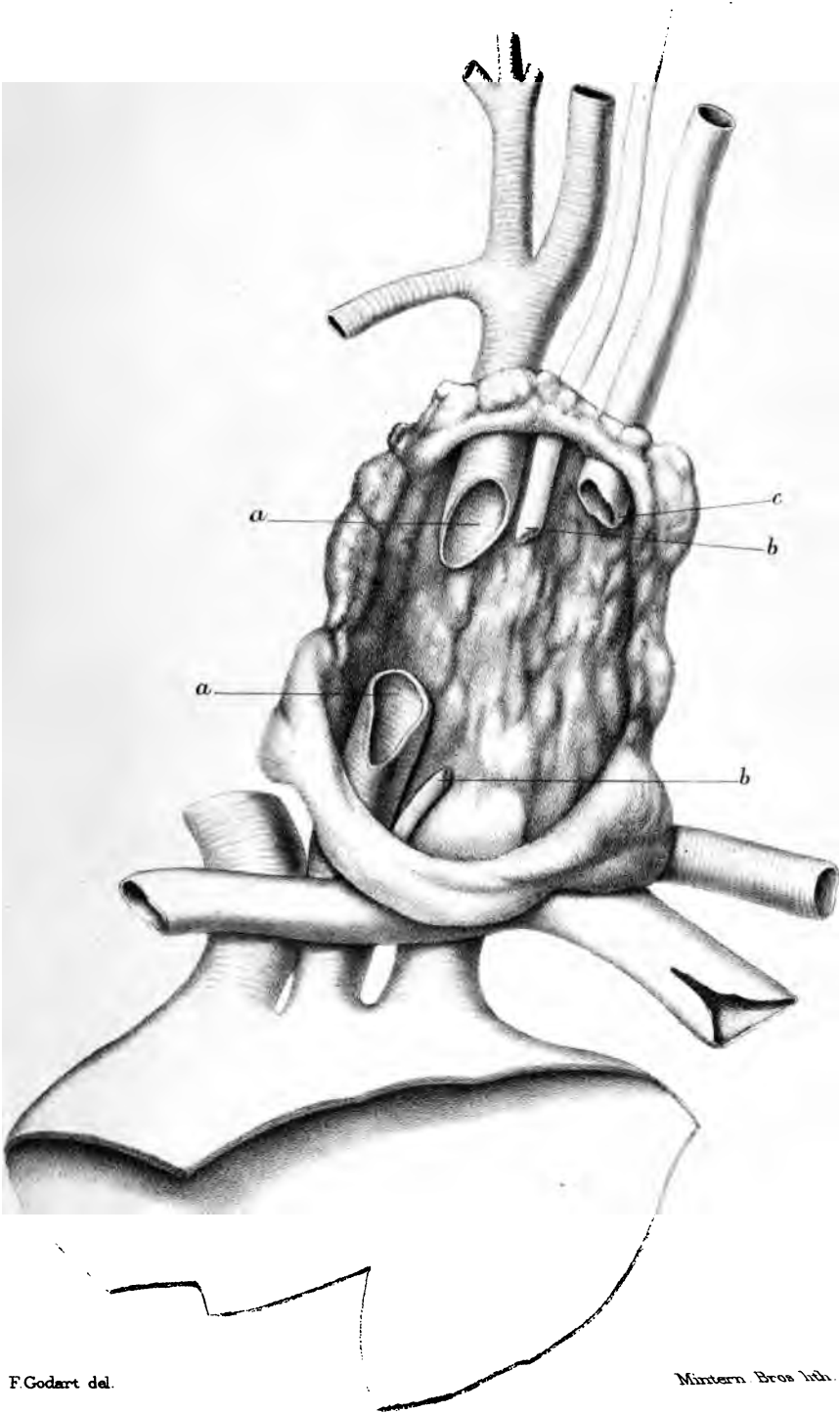
**DESCRIPTION OF PLATE I.**

**Abscess in the neck—(W. S. Savory, F.R.S.).**

*a a.* Carotid artery.

*b b.* Vagus nerve.

*c.* Jugular vein.







AMŒBOID MOVEMENTS  
OF THE  
COLOURLESS BLOOD-CORPUSCLES IN  
LEUCHÆMIA.

BY  
JOHN CAVAFY, M.D., F.R.C.P.,  
ASSISTANT-PHYSICIAN TO ST. GEORGE'S HOSPITAL.

---

(Received June 9th—Read November 9th, 1890.)

---

THE patient on whose blood the following observations were made, was admitted into St. George's Hospital on April 30th, 1879, under the care of Dr. Whipham, to whom I am much indebted for permission to make use of the case.

William W—, æt. 26, grocer, with a good family history, stated that he himself had been healthy with the exception of occasional attacks of sick headache and bilious vomiting, to which he had been subject from childhood. During the last four years the headaches had diminished in frequency and severity, but there had been some dyspepsia, which was always easily controlled by attention to diet. For the last month he had felt very languid and weak, and had frequent attacks of vomiting which were not accompanied by headache. His complexion had always been pale, and he had not noticed that his pallor had increased lately. Three weeks before

admission he got a cough, which did not trouble him much till April 24th, when he awoke in the night with a violent fit of coughing, followed by severe retching, during which he felt as if "his eyes were going to jump out of his head." The next morning he found both his eyes much blood-stained, and a few red spots on his body. As he felt very weak and ill, he came to the hospital a few days later, and was admitted in the following condition :

He was a stout, flabby, pale man, of middle height, with light brown hair and eyes. There were extensive ecchymoses under the palpebral and ocular conjunctivæ of both eyes, and a few small purpuric spots scattered over the chest, and on the right wrist, left knee, and ankle. Mucous râles were heard over both lungs, and a very soft systolic murmur was audible at the base of the heart. In both axillæ, over the right clavicle, and in the right groin, there were soft painless enlarged lymphatic glands, which had not previously attracted his attention. The liver dulness was normal, and no enlargement of the spleen could be made out on careful examination. The blood, on microscopical investigation, showed a great increase in the number of the colourless corpuscles, which were to the coloured in the proportion of 1 to 6. The tongue was clean and pale. Pulse 130, and temperature 101·4°.

He remained in the hospital for a little more than two months and a half, leaving at his own request on July 18th. During this time he got gradually worse, with occasional short intervals of apparent improvement. He continued to suffer from cough and dyspnoea, with great languor and loss of appetite. There was an attack of epistaxis on May 3rd, and fresh hæmorrhage took place in the conjunctivæ on May 24th and 26th after vomiting; and again on June 19th and July 8th, after severe coughing and retching. On these latter occasions multiple small spots of extravasation appeared over the chest and abdomen, and a large blood-patch on the left cheek.

The enlargement of the lymphatic glands ran a somewhat irregular course; they decreased in size at first, especially those in the axillæ, but later they again became swollen, and fresh ones appeared in the groins, the neck, and especially near the angles of the lower jaw, the latter attaining a considerable size. Splenic enlargement was first unmistakably detected early in June, and increased rapidly until the whole left side of the abdomen was occupied by the tumour; it was always tender on palpation or percussion. The liver also became somewhat increased in size. On June 21st he complained of slight sore throat, and on examination both tonsils were found much enlarged, nearly meeting in the middle line; they were not, however, inflamed, and troubled him chiefly by the mechanical impediment they opposed to swallowing. They remained in the same state until he left the hospital. The temperature was nearly always above normal, the highest reached being  $102.8^{\circ}$  on the morning of July 12th; by the following morning it had fallen to  $98^{\circ}$ , which was about its lowest; it was most frequently about  $100^{\circ}$ , with very irregular rises and falls, apparently unconnected with any change in his condition. The pulse was always quick, and averaged 120, the lowest rate being 108, and the highest 142. The urine was frequently examined and occasionally found to contain a trace of albumen; it often became turbid from urates, and once deposited crystals of uric acid.

After leaving the hospital, the patient came under the care of Mr. W. J. Hamlin, of Bow, who was kind enough to give an account of the further course of his illness. There was at first an apparent improvement, so that he was able for a short time to attend in some measure to his business; but the disease steadily increased, the glands in the neck became of enormous size, and numerous cutaneous hæmorrhages appeared from time to time. He became gradually weaker, and died early in October, 1879, the disease having lasted nearly seven months from the date to which he attributed its commencement. No

post-mortem examination was made, but the case presents no difficulties in diagnosis, being obviously well marked lympho-splenic leucæmia, and the appearances after death are of little moment for my present purpose.

The observations on the blood recorded in this paper were made with the object of determining how far the amœboid movements, which are so markedly characteristic of the colourless corpuscles in health, were preserved. They were made with a Stricker's hot stage, a drop of blood being placed between two cover-glasses with their margins oiled, so as to prevent evaporation. Twelve observations were made in all, the first ten by myself, Dr. Whipham being present at all except the sixth, which was witnessed by Dr. Pye-Smith; the last two were made by Dr. Whipham during my absence. In every case the same magnifying power was used (oc. 3, obj. 8, Hartnack, about 400 diams.), and the procedure was as follows:—The total number of colourless corpuscles in the field was first counted as nearly as possible, and then the number which exhibited amœboid movements was noted at intervals of about ten minutes, the temperature of the stage being taken at the same time. Three observations were usually made in this way on each occasion, and of these I have taken the mean and calculated the percentage in the accompanying table:

Obs.	Date 1879.	Total colourless.	Amœboid (Mean).	Per cent.	Temperature of stage.	Temperature of patient.	Duration of observation.
							Minutes.
1	May 16	46	6	Over 13	96·8 to 104°	100·5°	25
2	" 19	104	25	" 24	93·2 to 107·6°	99°	30
3	" 23	212	24	" 11	93·2 to 107·6°	99·6°	35
4	" 26	177	17	Under 10	104°	100°	30
5	" 30	102	10	" 10	104 to 105·8°	99·2°	30
6	June 3	230	10	"	5 98·6 to 107·6°	100°	40
7	" 7	300	27	"	9 98·6 to 111·2°	99·8°	30
8	" 16	480	16	"	4 98·6 to 100·4°	98·4°	30
9	" 23	210	17	Over 8	98·6 to 104°	Not noted	30
10	" 30	136	7	"	5 98·6 to 104°	"	30
11	July 7	310	18	"	5 93·2 to 104°	"	60
12	" 14	195	10	"	5 93·2 to 104°	100·6°	20

<sup>1</sup> Mean of six observations.

In determining whether a corpuscle was or was not amœboid, the very smallest departure from the spheroidal shape was taken as sufficient; although, in some cases when the corpuscles were only slightly oval, or less regularly rounded than those in which no movements occurred, I think it probable that other observers might have felt disposed to attribute the very slight change of form to accidental causes, such as pressure. If this be the case, the proportion of amœboid corpuscles would be still smaller than that recorded in the table. The character of the movements, when they were unmistakable, differed remarkably from that seen in health; although the observations were made mostly at febrile, and even hyperpyrexial, temperatures, which stimulate the movements in healthy corpuscles to an extreme degree, they were almost invariably very sluggish and ill marked, one or two short, blunt processes being very slowly protruded and as slowly retracted. It now and then happened that one or two corpuscles were found in a specimen which moved more actively than the remainder, although they still fell far short of normal heated examples. These relatively active corpuscles, which were only met with in a few of the observations, were distinguished by a bright, strongly-refracting aspect from the remainder, which were of a dull greyish appearance.

Three kinds of colourless corpuscles were found: small corpuscles of the size of a coloured corpuscle or less, consisting of a large nucleus with a narrow protoplasmic zone (lymphoid cells); ordinary colourless corpuscles, a little larger than a coloured one; and large, strongly granular cells, with the granules usually accumulated at one side of the periphery. Of these large cells only one or two were seen occasionally. All the above corpuscles have been found in normal blood, and amœboid examples of each kind were met with in the case under consideration. The most active, or rather the least sluggish, were found among the ordinary corpuscles, while the lymphoid, and especially the large granular cells, showed the merest

traces of movement. The lymphoid cells were most numerous in the first five or six observations, before the spleen had become markedly enlarged; after this had occurred the somewhat larger ordinary corpuscles were found to be most plentiful. No intermediate forms between coloured and colourless corpuscles were found. One point of some interest is, that coagulation took place much more rapidly in the later than in the earlier specimens, the field becoming very quickly covered with threads of fibrin which started from, or, at any rate, were connected with, the colourless corpuscles.

It will be seen on reference to the table that only a very small proportion of the corpuscles exhibited even the sluggish movements which I have described, the highest number being a little over 24 per cent. (Obs. 2), and the lowest under 4 per cent. (Obs. 8). Further, that with the progress of the disease during the time the patient was under observation there was a very distinct diminution in the proportion of amœboid corpuscles, the mean of the first six observations being about 12 per cent., while that of the last six is not more than 6 per cent. Although there is thus an unmistakable decline in the total number for the whole period, it will be seen that the numbers in successive observations often do not show a regular downward course; there is sometimes a decrease, but at others an increase in the percentage (compare Obs. 1, 2, and 3, and also 5, 6, 7, 8, and 9). I am not able to associate this fluctuation with any obvious change in the patient's condition, and suppose that it is merely an expression of the unexplained temporary improvements and deteriorations which occur so frequently in this disease.

It is a question of some interest whether the loss of amœboid movement takes place at the earliest onset of leucæmia; on this point I cannot speak with certainty, as my first observation was made when the disease was already well marked, and had existed for at least six weeks, according to the patient's statement of the time at

which he began to feel out of health; but I think we are justified in assuming a longer duration than this would give us, as hæmorrhages, which are among the later occurrences of leuchæmia, had already taken place before admission; further observations are necessary, therefore, to determine this point. It is, however, very probable, in my opinion, that loss of contractility in a large proportion of the colourless corpuscles will be found among the earliest phenomena.

Whether, and how far, amœboid movements are affected in various other diseases, is a not unimportant question which remains to be solved by future observations, and will, I think, repay investigation. I may here state that, for purposes of comparison, I examined the blood in two cases of chloro-anæmia, and one of anæmia from cancer of the stomach. The colourless corpuscles in these three cases were all amœboid at ordinary temperatures.

The earliest observations on the point I have brought before the Society were, so far as I have been able to find, made by Dr. Laking in 1873, at St. George's Hospital, with very similar results. They were not published, however, and, unfortunately, no record of them has been preserved.<sup>1</sup> In 1878 the absence of amœboid movement was communicated to the Pathological Society on April 16th, during the discussion on leuchæmia, by Dr. Pye-Smith,<sup>2</sup> to whom I had mentioned it, and was again shortly described by myself in a letter to the 'Lancet,' dated April 27th.<sup>3</sup> It was, however, stated at the same discussion by Dr. Moxon,<sup>4</sup> that Mr. Golding-Bird had found the leucocytes in leuchæmic blood to have active

<sup>1</sup> Since this paper was read, Dr. Bastian has pointed out that he has long been familiar with "the sluggishness of the white blood-corpuscles in this disease," and has informed me that the fact has been known to him since the latter part of 1868. Priority of observation on this point, therefore, belongs to him. (See 'Brit. Med. Journ.,' Nov. 27, 1880, p. 845, and ditto, Dec. 4, 1880, p. 881.)

<sup>2</sup> See report in 'Lancet,' vol. i, 1878, p. 607.

<sup>3</sup> Loc. cit., p. 662.

<sup>4</sup> Loc. cit. p. 607.



amœboid movements. The next observation with which I am acquainted was published in 1878 by E. Neumann,<sup>1</sup> and is of considerable interest. He examined the blood of a leuchæmic patient, and found it to contain chiefly small lymphoid cells, with a certain proportion of ordinary colourless corpuscles. No detailed account of his observations is given, but he states that the former showed no amœboid movement, and that the latter were extremely sluggish, even at high temperatures. He then examined the pus-cells obtained by blistering from the same individual, and found them all amœboid at ordinary temperatures, and very active on the hot stage. He concludes that the cells found in the blister-fluid cannot have migrated from the blood, but must have had some other origin, such as proliferation of connective-tissue corpuscles.

The observations I have brought forward warrant, I believe, the following conclusions :

I. The great majority of the colourless corpuscles in leuchæmia are dead or dying, and hence obviously incapable of further development.

II. As amœboid movement is practically lost, emigration from the blood-vessels is rendered impossible.

III. Coagulation, and hence the formation of capillary and other thrombi, is largely favoured.

The characteristic accumulations of lymphoid cells and colourless corpuscles which are found after death from leuchæmia in various organs and tissues, are attributed by Mosler<sup>2</sup> and Rindfleisch,<sup>3</sup> partly to extravasation by hæmorrhage, but they consider that a true *emigration* of colourless corpuscles, in the sense of Cohnheim, has a large share in their production. Further, Mosler accepts the doctrine of lymphatic new growth as accounting for a

<sup>1</sup> "Farblose Blut- und Eiterzellen," Berlin. Klin. Wochenschrift, 1878, p. 607.

<sup>2</sup> Art. "Leukämie," Ziemssen's 'Handbuch d. Speciellen Pathol. u. Therapie,' Bd. viii, 2te Hälfte, 1875, pp. 155—162.

<sup>3</sup> 'Handbuch d. Pathol. Gewebelehre,' ed. 4, 1875, p. 153.

portion, at least, of the secondary infiltrations, but this view is considered incorrect by Rindfleisch. Now, as the power of amœboid movement, on which emigration depends, is nearly lost, we must reject this process as capable of explaining the presence of more than an extremely minute proportion of colourless corpuscles or lymphoid cells outside the blood-vessels. The vast majority must have escaped by rupture, but it is, I think, probable that an accumulation of lymph-cells in perivascular and other lymphatic channels has also much to do with their origin. It is a warrantable supposition that many of the cells shed directly into the lymphatic system have remained there without ever penetrating as far as the blood-vessels. In support of this view I may adduce the important part played by the colourless corpuscles in coagulation, and the production of the fibrin factors.<sup>1</sup> The researches of A. Schmidt and later observers render it extremely probable that the components of fibrin, especially the fibrin-ferment, are contained in the colourless corpuscles, from which they are discharged on their death and disintegration; if, then, the vast majority of these corpuscles in leucæmia are dead or dying, the fibrin generators must be liberated in large quantity and thus give rise to the formation of clots, coagulation being doubtless favoured by textural changes in the vessels and tissues due to mal-nutrition. In this way thrombi will be formed, not only in blood-vessels, but also in lymphatics, and an effectual obstacle opposed to further circulation through the plugged vessels. In the case of the lymphatics it is theoretically probable that many corpuscles would thus be prevented from entering the blood. So far as the blood-vessels are concerned, the investigations of Cohnheim<sup>2</sup> have shown what an important part is played by embolism and thrombosis in the production of extravasations. I believe that the majority of secondary leucæmic nodules is to be explained by these two

<sup>1</sup> See, On Coagulation, Foster, 'Text-book of Physiology,' ed. 3, pp. 12—16; Landois, 'Lehrbuch d. Physiologie,' pp. 49—57.

<sup>2</sup> 'Untersuchungen über die Embolischen Processe,' 1872.

processes, extravasation and lymphatic accumulation, and that emigration has only a very minute share in their production. With regard to lymphatic new growth we must be sure that the so-called "stroma" to be seen in pencilled or washed sections is a true adenoid reticulum, and not simply composed of a network of threads of fibrin,<sup>1</sup> a point which requires further histological investigation.

In conclusion, I may point out that the absence of amœboid movement has a bearing on diagnosis as well as pathology. It is known that cases of early leuchæmia often present great difficulties, which cannot be at once settled by a simple examination of the blood. The colourless corpuscles may be found largely increased, and still it may not be by any means easy to decide whether we have to do with leuchæmia, or with simple leucocytosis, especially as cases occur in which a splenic tumour, arising from causes other than leuchæmia, is accompanied by a temporary increase in the colourless corpuscles.<sup>2</sup> If the absence of amœboid movement be, as I believe, an essential character of true leuchæmia, it is plain that attention to this point may prove of great value in doubtful cases. I have already referred to a case of cancer of the stomach<sup>3</sup> in which I examined the blood; there was in this instance a very large increase in the colourless corpuscles, but they were all actively amœboid, even at ordinary temperatures. I mention this only as an illustration of the fact that leucocytosis may occur without loss of amœboid movement; and although it is perhaps too early to draw a final conclusion, I think we may reasonably expect that its presence, or absence, will prove of primary importance when we are called upon to distinguish between leuchæmia and increase of colourless corpuscles from other causes.

<sup>1</sup> Greenfield, 'Path. Trans.,' vol. xxix, 1878, p, 303.

<sup>2</sup> Mosler, 'Pathol. u. Therapie d. Leukämie,' 1872, pp. 204, 222, 224.

<sup>3</sup> Communicated to the Clinical Society by Dr. Whipham, on May 28th, 1880.

ON  
ARTIFICIAL RESPIRATION IN STILL-  
BORN CHILDREN.

THE AMOUNT OF VENTILATION SECURED BY  
DIFFERENT METHODS.

AN EXPERIMENTAL INQUIRY.

BY

FRANCIS HENRY CHAMPNEYS, M.A., M.B. OXON.,  
M.R.C.P., F.L.S.,

ASSISTANT LECTUREE ON MIDWIFERY, ETC., AT, AND ASSISTANT OBSTETRIC  
PHYSICIAN TO, ST. GEORGE'S HOSPITAL.

---

(Received October 4th—Read November 23rd, 1880.)

---

*Preface.*

The question whether a new-born child shall live or die is a matter of so great importance that no apology is needed for such an investigation as is here detailed; the answer to this question not uncommonly depends upon the success or failure of artificial respiration.

In spite of the importance of the subject, nothing is accurately known with regard to it, and even good text-books on midwifery pass over it superficially.

It is not proposed to deal at once with the whole matter, which is far too large for summary treatment; this object

will probably be better attained by dividing the subject and treating each division in detail.

The present inquiry deals solely with the question, "What relative amount of air is each of the various methods capable of introducing into the lungs of a new-born child which has never breathed?" This question is as yet unanswered; for the various committees which have investigated the main question have hitherto confined their attention to adults, and even the interesting experiments of Behm, which were performed on six new-born children, dealt with children which had not breathed in three cases only, in one of which the experiments failed—a point which seems to have affected his results.

The present investigation, being solely experimental, elucidates many points in the physiology of the respiration of new-born children.

These experiments, dealing as they do with children in whom (for instance) the circulation is not proceeding, no doubt require translation into terms of children in whom the circulation has not yet ceased.

On the other hand, they eliminate the influence of reflex action, a most important matter where methods are to be rigidly tested, and practically of great moment where the children are in the stage of pale (flabby) asphyxia, in which reflex action is abolished, and which includes all cases of real difficulty.

This question of the stage of asphyxia is a point on which far too little stress has been laid, the facts being that almost any form of irritation may be sufficient to excite inspiratory efforts in a case of the first (livid) stage of asphyxia, whereas in the second (pale) stage, not only can reflex action not be relied on, but all forms of irritation are simply useless and waste time.

It is curious to read the correspondence which has followed the introduction of each new method of artificial respiration, the writers kindly hastening to contribute their mite of evidence in favour of the method, in the form of cases absolutely without any trustworthy details

of the stage of asphyxia, and therefore absolutely worthless.

It may be perfectly true that a child can be recovered in select cases either by slapping the nates or by Silvester's method, but to put the two methods together is unphilosophical and likely to obscure rather than to elucidate the question. On the other hand, it is certain that in the only important class of cases slapping and all other forms of irritation are simple waste of time.

Many of the accounts with which the papers have been repeatedly inundated, relate to cases which would probably have recovered if simply let alone.

In order to establish a numerical superiority with regard to any one method according to this system, it would only be necessary to apply it to all children born (an argument which applies to the frequent use of the forceps).

The desiderata of a method of artificial respiration are summarised by Behm as (a) ventilation of the lungs, (b) excitation of the circulation, (c) removal of foreign bodies from the air passages. Of these, only the first is here considered.

It has been thought best to give a description of each method from the original source, as even the common methods are most inaccurately known.

It is not, for instance, an edifying spectacle to see one surgeon leaning his whole weight on a patient's abdomen at the same time as another surgeon elevates the arms, in the belief that Silvester's method is being pursued.

No details which secure even a small excess of ventilation of the lungs are unimportant, and a consideration of such details is included in this inquiry.

The number of bodies experimented on is twenty-six of which twenty have been used for the investigation of this portion of the subject.

The experiments were begun January 5th, 1878, and ended July 5th, 1880.

All the bodies used were those of children who had

never breathed, both in order to keep within the law and also to procure uniform material for investigation.

It will be pointed out that the chest of a child which has breathed differs essentially from one which has never breathed.

It must be observed that a source of error exists in the order followed in the experiment, the subsequent experiments usually succeeding better than the earlier ones, from increasing ventilation of the lungs.

This error has been eliminated as much as possible by varying the order, and by repeating experiments after the lungs have been shown to have become expanded.

Another error exists in the stretching of the pectoral muscles which is liable to occur in Schultze's and Silvester's methods, especially the modifications of the latter.

The following methods have been employed :

1. Marshall Hall.
2. Howard.
3. Silvester.
4. Pacini.
5. Bain.
6. Schücking.
7. Schüller.
8. Schroeder.
9. Schultze.

They may be classified according to the principle on which they depend.

*Classification of methods of manipulation according to their mode of action with regard to ventilation of the lungs.*

The methods aim at procuring inspiration.

I. Indirectly . . { By elastic recoil of } 1. Marshall Hall.  
the chest walls } 2. Howard.

II. Directly	{	A. By traction	{	1. Upward traction of the ribs, clavicles, and sternum	{	1. Exerted through the arms; (3) Silvester; (4) Schücking. 2. Exerted through the shoulders; (5) Pacini; (6) Bain.
		B. By gravitation and centrifugal force	{	2. Upward and outward traction of the lower ribs, and consequent depression of the diaphragm Elevation of the ribs, clavicles, and sternum, and depression of the diaphragm	{	7. Schüller. 8. Schultze.
		C. By flexion	{	Increasing capacity of cylindrical thorax by curvature of its anterior wall	{	9. Schroeder.

*Description of methods.*

1. *Marshall Hall* ('Lancet,' 1856, March 1, p. 229, "On a New Mode of Effecting Artificial Respiration," by Marshall Hall, M.D., F.R.S., and April 12th, p. 393, "Asphyxia, its Rationale and Treatment.") "Let the patient be placed in the prone position, the head and neck being preserved in their proper place. The tongue



will fall forwards, and leave the entrance into the windpipe free. . . . Let the body be now turned gently on the side (through rather more than a quarter of a circle), and the pressure on the thorax and abdomen will be removed, and inspiration . . . will take place ! The expiration and inspiration are augmented by timeously applying and removing alternately pressure on the spine and ribs."

(P. 394.) "Replace the patient on his face, his arms under his head, that the tongue may fall forward and leave the entrance into the windpipe free, and that any fluids may flow out of his mouth ; then 1. Turn the body gradually but completely on the side, and a little more, and then again on the face, alternately (to induce respiration and expiration). 2. When replaced, apply pressure along the back and ribs, and then remove it (to induce further inspiration and expiration), and proceed as before.

2. *Howard* ('*Lancet*,' 1877, August 11, p. 194). P. 196 : "Seize the patient's wrists, and having secured the utmost possible extension with them crossed behind his head, pin them to the ground with your left hand so as to maintain it. . . . The rest consists in throwing the weight of the body on the lower ribs, and then suddenly relieving the pressure (this of course requires modification in a foetus). It can be practised before division of the funis or after."

3. *Silvester* ('*The True Physiological Method of Restoring Persons apparently Drowned or Dead, and of Resuscitating Stillborn Children*,' by Henry R. Silvester, B.A., M.D. Lond., 1858). "1. To adjust the patient's position place the patient on his back with the shoulders raised and supported on a folded article of dress. 2. To maintain a free entrance of air into the windpipe (by drawing the tongue forwards). 3. To imitate the movements of deep respiration raise the patient's arms upwards by the sides of his head, and then extend them gently and steadily upwards and forwards for a few moments. Next turn down the patient's arms and press them gently and firmly for a few moments against the sides of the chest."

In Fig. 4, p. 17, the operator grasps the arms above the elbows. The arms are not everted.

Also 'The Discovery of the Physiological Method of inducing Respiration in cases of Apparent Death from Drowning, Chloroform, Still-birth, Noxious Gases, &c.,' 3rd ed., 1853.

The directions are the same as above, except that (p. 20) the feet are to be secured; the arms are to be kept "stretched steadily" (upwards) for "two seconds" instead of "a few moments." The operator grasps the arms above the elbows, but in the figure he has seized them distally to the elbows (figs. 24 and 25).

*Pacini* ('Di un nuovo metodo di praticare la Respirazione artificiale,' Firenze, 1867). The feet of the patient being fixed the operator stands with the head against his own abdomen, and then with his hands takes a firm hold of the upper part of the arms, applying the forefingers behind and close to the armpit, while the thumb is in front of the head of the humerus. Holding the shoulders thus, he pulls them towards him, and then lifts them in a perpendicular direction.

5. *Bain* ('Med. Times and Gazette,' 1868, December 19th, p. 708). 1st method. The fingers are placed over the front of the axillæ, the thumbs over the ends of the clavicles; the operator then draws the shoulders upwards, and then relaxes his traction.

2nd method. The shoulders are raised by taking hold of the hands and raising the body about a foot off the table, the position of the arms being at about an angle of 45° beyond the head.

6. *Schrücking* ('Berl. Klin. Wochenschr.,' 1877, No. 2, p. 19). The same as *Silvester*, except that the arms are drawn upwards and outwards.

7. *Schüller* ('Berl. Klin. Woch.,' 1879, June 2nd, p. 319). The operator, standing either at the left side or at the head of the patient, raises the edges of the ribs with his fingers placed beneath them, and then depresses them. The knees should be kept bent to relax the abdominal

walls. The manipulation flattens and depresses the diaphragm.

8. *Schroeder* ('Lehrbuch der Geburtshülfe,' Bonn., 1874, p. 673) suggests supporting the child by the back only, letting the arms and legs fall backwards (which will produce opisthotonos), and then bending them in the contrary direction (producing emprosthotonos). The latter to produce expiration, the former inspiration.

9. *Schultze* ('Der Scheintod Neugeborener,' Jena, 1871, p. 162). The navel string being tied, the child is seized with both hands by the shoulders in such a way that both thumbs lie on the anterior wall of the thorax, both index fingers extend from behind the shoulders into the axillæ, and the other three fingers of both hands lie obliquely along the posterior wall of the thorax. The head is prevented from falling by the support of the ulnar sides of the two hands.

The operator stands with somewhat separated legs, and bends slightly forwards, holding the child as above described at arms' length, hanging perpendicularly (*1st position, inspiratory*).

Without pausing, he swings the child upwards from this hanging position, at arms' length. When the operator's arms have gone slightly beyond the horizontal, they hold the child so delicately that it is not violently hurled over, but sinks slowly forwards and forcibly compresses the abdomen by the weight of its pelvic end (*1st movement, expiratory*).

At this moment the whole weight of the child rests on the operator's thumbs lying on the thorax (*2nd position, expiratory*).

Any compression of the thorax by the hands of the operator must be carefully avoided. The body of the child rests during the first position with the floor of the axilla on the index fingers of the operator exclusively, and no compression should be exercised on the thorax in spite of the support offered by the hands to the head, nor should the thumbs compress the thorax in front.

When the child is swung upwards, the spinal column should not bend in the thoracic but only in the lumbar region, and the thumbs should not at this time strongly press the thorax, but should only support the body as it sinks slowly forward.

The raising of the body as far as the horizontal should be effected by a powerful swing of the arms (of the operator) from the shoulders; but from that point the arms should be raised more and more slowly, and, by means of a delicately-adjusted movement of the elbow-joints and scapulæ on the thorax, the pelvic end of the child should fall gradually over. By this gradual falling over of the child's pelvis over the belly, considerable pressure of the thoracic viscera is exercised both against the diaphragm and the whole thoracic wall. At this point the inspired fluids often pour copiously from the respiratory openings.

After the child has slowly but completely sunk over, the operator again lowers his arms between his separated legs. The child's body is thereby extended with some impetus; the thorax, released from all pressure (the operator's thumbs lying now quite loosely on the anterior wall of the chest), expands by means of its elasticity; but the weight of the body hanging, as it does, on the index fingers of the operator by the upper limbs, and thus fixing the sternal ends of the ribs, is brought into use for the elevation of the ribs with considerable impetus; moreover, the diaphragm descends by virtue of the impulse which is communicated to the abdominal contents. By this means a deep inspiration is quite passively produced (*2nd movement, inspiratory*).

After a pause of a few seconds, in 1st inspiratory position, the child is again swung upwards into the previous position (*1st movement, 2nd position, expiratory*), and while it sinks slowly forwards it brings its whole weight to bear on the thumbs, which rest on the anterior thoracic wall, and mechanical expiration again ensues. At this point any inspired fluids always pour copiously from the mouth and nose, and generally meconium from the anus.

The proceeding is repeated eight or ten times a minute, but more slowly when the inspired fluids flow from the mouth and nose.

*Description of apparatus.*

Tracheotomy was performed, and a canula tied into the trachea, this canula being in connection with an india-rubber tube, interrupted by a **T**-piece closed by a clamp, for the purpose of admitting air when desired. (When this clamp was opened the manometer is said to have been *readjusted*.) The other end of this tube was connected with a **V**-tube filled with water to a marked point, about half-way up. Inspiration, therefore, produced a rise of the water in the limb of the tube to which the india-rubber tube was attached, and expiration a corresponding fall. The readings in inches refer to the height of the fluid in this limb above the zero or line of original level (the actual height of the column of fluid being double this), and not to the cubic amount of air inspired.

The **V**-tube was not long enough to register more than six or seven inches above the line of zero; when the effect exceeded this, the manometer was readjusted half way, the subject being held in *statu quo*.

These facts do not vitiate the comparison of the relative inspiratory value of each different method, but they would have to be remembered in calculating the absolute inspiratory value.

Each inch in length of the manometer tube held about 2 c. c.

The results in the same body only are compared.

Exp. 1.—Male child, at eighth months. Craniotomy, January 5th, 1878, 9 p.m.; experiment, January 9th, 10 a.m. (83 hours). Trachea divided, canula tied in, tube connected with water manometer.

1. Lungs not inflated.

a. Marshall Hall	}	= 0
b. Silvester		
c. Schroeder		
d. Schultze		= rise $\frac{1}{4}$ in.

2. Upper and lower parts of trachea connected by a canula which was tied in, so as to restore the continuity of the trachea. Head bent back, lungs inflated by mouth to mouth method. (N. B.—Considerable force was required.) Experiments failed, the lungs had been burst by mouth to mouth inflation.

Exp. 2.—Male child, prematurely born at seventh month. Partial placenta prævia; heart beating at birth, but no respiratory efforts. Birth at 1 a.m. March 29th, 1878; experiment March 30th, 1 p.m. (36 hours). Tracheotomy, canula in trachea, connected with manometer, lungs inflated through tube.

1. *Marshall Hall*.—Simple change of position in this method produced only the slightest oscillation. Thoracic pressure produced  $\frac{1}{4}$  inch fall. Thoracic and abdominal pressure produced  $\frac{1}{2}$  inch fall.

On putting the child into the expiratory position, applying thoracic and abdominal pressure, and connecting the manometer afresh, relaxation of the pressure produced a rise of a quarter of an inch, very slightly increased on turning the child into the inspiratory posture.

2. *Silvester*.—(a.) Without previous pressure on thorax or abdomen. Inspiratory movement produced  $1\frac{1}{2}$  inch rise. Abdominal and thoracic pressure produced  $\frac{1}{2}$  inch fall.

(b.) After applying thoracic and abdominal pressure, manometer was readjusted. Inspiratory movement=2 inches rise.

3. *Schroeder*.—No change except  $\frac{3}{4}$  inch fall with extreme opisthotonos,  $\frac{1}{4}$  inch fall with extreme emprostotonos.

4. *Schultze*.—(a.) Expiratory movement expelled  $\frac{3}{4}$  inch, inspiratory movement inhaled  $\frac{1}{2}$  inch; on hanging the body by the forearms  $1\frac{1}{2}$  inch was inspired.

(b.) Inspiratory movement inhaled 1 inch. On hanging the body by the forearms stretched outwards and backwards, as in Silvester's method the total inspiration =  $4\frac{1}{2}$  inches.

(c.) After reinflation of the lungs. Expiration expelled 2 inches. Inspiration by the combined (Schultze-Silvester) method as above (b) inhaled 1 inch.

(d.) After reinflation of the lungs. Expiration = 2 inches. Inspiration (Schultze-Silvester) =  $3\frac{1}{2}$  inches.

After many experiments it was evident that though the maximum and minimum changes varied, the Schultze-Silvester method (as above) produced much more change than other methods.

	Maximum inspired.
Order 1. Schultze-Silvester	$4\frac{1}{2}$ inches.
2. Silvester	2     "
3. Schultze	1     "
4. Marshall Hall	$\frac{1}{2}$ "
5. Schroeder	fall in all cases.

EXP. 3.—Female child, full time; accidental hæmorrhage. Born April 6th, 1878, at 10 p.m.; experiment April 8th, 1878, 2 p.m. (40 hours). Tracheotomy, canula in trachea, lungs inflated through tube of manometer.

1. *Marshall Hall*.—Simple change of posture produced only a slight oscillation. Expiratory posture with thoracic pressure produced  $\frac{1}{4}$  inch fall. Expiratory posture with thoracic and abdominal pressure produced 1 inch fall. Relaxation of this pressure produced a rise of  $\frac{1}{4}$  inch, sometimes very slightly increased, but oftener slightly diminished by turning child on its back.

2. *Silvester*.—(a.) Without thoracic or abdominal pressure. Inspiratory movement =  $1\frac{1}{2}$  inch rise. Abdominal and thoracic pressure produced  $\frac{1}{2}$  inch fall (below zero).

(b.) Abdominal and thoracic pressure applied, manometer readjusted. Inspiratory movement = 2 inches.

3. *Schroeder*.—Extreme opisthotonos produced  $\frac{1}{2}$  inch fall. Extreme emprosthotonos produced  $\frac{3}{8}$  inch fall.

4. *Schultze*.—(a.) Expiration = 3 inches fall. Mano-

meter readjusted. Inspiration=1 inch rise. On repeating the experiment several times without readjusting manometer, the column fell three inches on expiration, and rose 1 inch on inspiration.

(b.) Combined Schultze-Silvester produced  $1\frac{1}{2}$  inch rise.

(c.) Inspiration (as described by Schultze) produced 1 inch rise. On hanging body by forearms (Schultze-Silvester) the total inspiration reached  $1\frac{3}{4}$  inch.

(d.) Extreme opisthotonos in the position of inspiration produced a fall of  $\frac{1}{2}$  inch, apparently from overstretching of the anterior abdominal walls, by which they were approximated to the spine.

5. *Howard*.—On relaxing pressure the column rose very slowly  $\frac{1}{4}$  inch, the thoracic walls very slowly altering their shape, their expansion lasting for one minute.

	Maximum inspired.
Order 1. Silvester	2 inches.
2. Schultze-Silvester	$1\frac{3}{4}$ „
3. Schultze	1 „
4. Marshall Hall	$\frac{1}{4}$ „ +
5. Howard	$\frac{1}{4}$ „
6. Schroeder	fall in all cases.

Exp. 4.—Female child, full time. Born April 14th, 1878, 7 p.m.; experiment April 15th, 3 p.m. (20 hours). Tracheotomy, &c., lungs inflated.

1. *Marshall Hall*.—(a.) Simple change of posture produced only slight oscillation.

(b.) Expiration with thoracic pressure= $3\frac{1}{2}$  inches fall.

(c.) Expiration (subsequently) with thoracic and abdominal pressure=2 inches fall.

(d.) Thoracic and abdominal pressure applied, and manometer readjusted. Relaxation of pressure produced a rise of  $\frac{1}{4}$  inch, which was not increased on turning child into inspiratory posture.

2. *Silvester*.—(a.) Without previous thoracic and abdominal pressure only slight oscillation produced.

(b.) Thoracic and abdominal pressure applied, and



manometer readjusted; result of Silvester's method—only slight oscillation.

3. *Schroeder*.—Extreme opisthotonos produced a slight fall which emprosthotonos increased to 1 inch, and which diminished to a fall of  $\frac{1}{4}$  inch on repeating the opisthotonos.

4. *Schultze*.—(a.) Expiratory movement caused  $\frac{1}{2}$  inch fall. Manometer readjusted. Inspiratory movement caused  $\frac{1}{4}$  inch rise. On repeating this experiment several times the amount of rise and fall increased until inspiratory movement caused 1 inch rise, and expiratory movement 2 inches fall.

(*Note*.—The cause of this was probably clearing the air-passages of mucus, and increasing expansibility of the lungs.)

(b.) On repeating the above without readjusting the manometer, the column, after many trials, fell 3 inches on expiration, rising only to level on inspiration.

(*Note*.—Thus the total change agrees with that of the first experiment (a), amounting to 3 inches in both cases.)

(c.) Inspiratory movement combined with hanging child by forearms (*Schultze-Silvester*) produced a rise of  $1\frac{1}{4}$  inch.

(d.) Inspiratory movement (ordinary) produced a rise of  $\frac{1}{2}$  inch; on hanging child by forearms this was increased to nearly 1 inch; on bending the body backwards (opisthotonos) the amount was reduced to  $\frac{1}{4}$  inch, apparently from over-stretching of abdominal walls.

*Note 1*.—The column rose violently with *Schultze's* method, overshooting the level permanently maintained. This violence was seen in no other method.

*Note 2*.—During the employment of *Schultze's* method great care was taken to avoid stretching of the tube; stretching of the tube produced rise of the fluid, from rarification of the air.

5. *Howard*.—Inspiration =  $\frac{1}{4}$  inch or a little more, the thorax took  $\frac{3}{4}$  minute to expand, which it did very slightly.

	Maximum inspired.
Order 1. Schultze-Silvester	1½ inch.
2. Schultze	1 „
3. Howard	¼ „ +
4. Marshall Hall	¼ „
5. Silvester	0
6. Schroeder	fall in every case.

Exp. 5.—Male child, full time. Placenta prævia; still-born, without inspiratory efforts or artificial attempts. Born May 17th, 1878, 1 p.m.; experiment May 18th, 4.30 p.m. (27½ hours). Manometer connected. No inflation of lungs.

1. *Marshall Hall* = 0.

2. *Silvester*.—Inspiration (1) = 1½ inch, (2) = 1¾ inch, (3) = 2½ inches. Expiration restored level of manometer.

3. *Schroeder*.—Inspiration = 0. Expiration = ¼ inch fall.

4. *Schultze*.—(a.) Inspiration varied from 1 to 2½ inches. Expiration restored level of manometer.

(b.) On letting body hang by forearms (*Schultze-Silvester*), inspiration reached four inches.

(c.) Abdominal and thoracic pressure produced not more than ¼ inch fall.

	Maximum inspired.
Order 1. Schultze-Silvester	4 inches.
2. Schultze	} 2½ „
3. Silvester	
4. Schroeder	} 0
5. Marshall Hall	

Exp. 6.—Male child, full time. Breech presentation. Born June 24th, 1878, 1 a.m.; experiment June 26th, 1 p.m. (60 hours). Manometer adjusted, lungs inflated.

1. *Marshall Hall*.—Expiration = ¾ inch fall. Inspiration = 0.

2. *Silvester*.—(Note.—Very forcibly performed, the force exceeding that which could be safely used to a living

child.) Inspiration (1) =  $\frac{1}{2}$  inch, (2) =  $1\frac{1}{4}$  inch, (3) =  $2\frac{1}{2}$  inches, (4) =  $3\frac{1}{2}$  inches, (5) = 4 inches, (6) =  $4\frac{1}{2}$  inches. Expiration in each case restored the level of the manometer.

3. *Schroeder*.—Opisthotonos produced slight oscillation. Emprosthotonos =  $\frac{1}{4}$  inch fall.

4. *Schultze*.—(a.) Manometer readjusted during inspiratory position. Expiration = 1 inch fall. Inspiration =  $\frac{1}{2}$  inch rise.

(Note.—The fluid rose to 1 inch, but this was not maintained, the action was rapid and violent in all cases.)

(b.) Manometer readjusted while child was held in expiratory position. Inspiration rose gradually from  $\frac{1}{2}$  inch to four inches, but not more than  $1\frac{1}{4}$  inch was maintained. Expiration restored level of fluid.

(c.) Manometer readjusted between expiratory and inspiratory movements, so as to equalise pressures. Expiration =  $\frac{1}{2}$  inch fall. Inspiration = 1 inch rise.

(d.) Inspiratory movement completed by hanging body from forearms (*Schultze-Silvester*). Inspiration =  $2\frac{1}{2}$  inches (permanent). Expiration restored level of fluid.

5. *Howard*.—Produced the merest oscillation.

Maximum inspired.

- |                                |                               |
|--------------------------------|-------------------------------|
| 1. <i>Silvester</i> (forcible) | $4\frac{1}{2}$ inches.        |
| 2. <i>Schultze</i>             | 4 „ (level never maintained). |
| 3. <i>Schultze-Silvester</i>   | $2\frac{1}{2}$ „              |
| 4. <i>Schroeder</i>            | } 0                           |
| 5. <i>Marshall Hall</i>        |                               |
| 6. <i>Howard</i>               |                               |

Exp. 7.—Male child, full time (?). Cæsarian section June 24th, 1878, 5.30 p.m.; experiment June 26th, 2.30 p.m. (45 hours).

A. Manometer adjusted; lungs not inflated.

1. *Marshall Hall*.—Results = 0.

2. *Silvester*.—Inspiration gradually reached  $\frac{1}{2}$  inch. Expiration restored level of fluid.

3. *Schroeder*.—Produced slight oscillation.

4. *Schultze*.—The same.

B. Lungs were inflated. No method produced results.

No conclusions can be derived from this series of experiments.

EXP. 8.—Male child at eighth month. Breech presentation. Born October 11th, 1878, 7 p.m.; experiment October 13th, 11 a.m. (40 hours). Body, which was cold and stiff, thawed in warm water. Manometer adjusted; lungs not inflated.

1. *Marshall Hall*.—Results = 0.

2. *Silvester*.—(a.) On raising arms above head, as soon as abdominal and thoracic walls became tight the fluid was depressed. This was repeated several times.

(b.) On fixing feet and applying considerable force to the upper limbs, the fluid rose with one bound to 4 inches, falling on expiration to 1 inch (above zero).

(c.) On repeating this experiment, the manometer being readjusted, the fluid rose to 5 inches; expiration restoring its level.

(d.) &c., &c. In many subsequent repetitions the fluid rose to 5 inches on inspiration, falling either to one inch above zero, to zero, or to 1 inch below zero on expiration.

(e.) Strong abdominal pressure produced a further fall of 1 inch.

(Note.—Towards the end of this experiment loud whistling was heard at the root of the neck, due to mediastinal emphysema and pneumothorax. This vitiates the experiment.)

3. *Schroeder*.—Opisthotonos and emprosthotonos both produced slight fall of the fluid.

4. *Schultze*.—Inspiration by degrees reached 3 inches.

(Note.—This is remarkable considering the presence of pneumothorax.)

No results can be deduced from this series of experiments.

EXP. 9.—Male child, full time. Breech presentation,

large size. Born November 26th, 1878, 9.30 a.m.; experiment November 27th, 1878, 9.30 a.m. (24 hours). Double talipes varus; spina bifida. Body very cold and stiff, thawed in hot bath. Manometer adjusted, lungs not inflated.

1. *Marshall Hall*.—(a.) Body turned on face with block under thorax; thoracic and abdominal pressure produced  $\frac{1}{2}$  inch fall; on readjusting manometer and relaxing pressure  $\frac{1}{18}$  inch rise; on then turning body into inspiratory position  $\frac{1}{4}$  inch rise.

(b.) Simple change of posture without pressure produced only slight oscillation.

2. *Silvester*.—A. No pressure on thorax or abdomen. Inspiration (arms rotated *inwards*) =  $\frac{1}{4}$  inch. Inspiration (arms rotated *outwards*) =  $\frac{1}{2}$  inch. Pressure on thorax and abdomen produced  $\frac{1}{4}$  inch fall.

B. Manometer readjusted during pressure on thorax and abdomen. On relaxing this pressure, fluid rose  $\frac{1}{4}$  inch. On raising arms rotated *inwards*, slight additional rise was produced. On raising arms rotated *outwards*, the rise reached  $\frac{3}{4}$  inch.

C. Legs were held and arms forcibly raised rotated *inwards*, rise = 6 inches. Rotated *outwards*, rise = 8 inches.

(Note 1.—The manometer would not register more than 6 inches, the rise of 8 inches was estimated by readjusting manometer midway.

Note 2.—The outward rotation of arms of course rendered the pectoral muscle tenser.)

D. *Marshall Hall*.—Repeated under the more favourable conditions of lungs already expanded, produced no better results than before.

E. *Schultze*.—A. The child being held in inspiratory position. (a.) Expiration produced 1 inch fall.

(b.) Pressure applied to thorax and abdomen produced a fall of one inch; this was not increased by throwing child into expiratory posture.

(Note.—i.e. Schultze's expiratory posture produced results equal to pressure on thorax and abdomen.)

b. Child being held in expiratory posture manometer was readjusted. Inspiration rose in subsequent experiments gradually from  $\frac{1}{2}$  to  $5\frac{1}{2}$  inches. Expiration restored level of fluid.

c. Child suspended by arms at the end of inspiratory movement (Schultze-Silvester). Inspiration = 7 inches.

(Note.—Manometer was readjusted at the end of Schultze's inspiratory movement, and before the child was suspended by the arms.)

4. Howard.—Inspiration =  $\frac{1}{8}$  inch rise.

Maximum inspired.

Order 1. Silvester (forcible) 8 inches.

2. Schultze-Silvester 7 „

3. Schultze  $5\frac{1}{2}$  „ (level never maintained).

4. Marshall Hall  $\frac{1}{4}$  „

5. Howard  $\frac{1}{8}$  „

Exp. 10.—Female child, said to have died in utero after a blow on the mother's abdomen two weeks before term. The child was small and seemed more than two weeks before term. Born December 16th, 1878, 5 a.m.; experiment 2.30 p.m. ( $6\frac{1}{2}$  hours). Manometer adjusted; lungs not inflated.

1. Marshall Hall.—(a.) Pressure along the back in the prone position with a block under the thorax produced  $\frac{1}{4}$  inch fall.

(b.) Manometer readjusted and pressure relaxed; oscillation.

(c.) On then turning body into inspiratory posture =  $\frac{1}{4}$  inch rise.

(d.) Inspiration without previous pressure =  $\frac{1}{4}$  inch rise.

2. Silvester.—A. No previous pressure on thorax and abdomen.

(a.) Inspiration (arms rotated *inwards*) =  $\frac{1}{4}$  inch rise.

(b.) Inspiration (arms rotated *outwards*) produced at first  $\frac{3}{4}$  inch rise, which increased gradually in repeated experiments to  $2\frac{1}{4}$  inches.

B. Thoracic and abdominal pressure, manometer re-adjusted.

(a.) Pressure simply relaxed =  $\frac{1}{8}$  inch rise.

(b.) Inspiration (arms rotated *inwards*) = total rise of  $\frac{1}{4}$  inch.

(c.) Inspiration (arms rotated *outwards*) =  $2\frac{1}{2}$  inches rise.

(Note.—This rise of  $2\frac{1}{2}$  inches occurred suddenly, and with a sort of rhonchus as if the air had forced its way past a plug of mucus.)

c. Legs held and arms forcibly elevated.

(a.) Arms rotated *inwards* = 5 inches rise.

(b.) Arms rotated *outwards* = 5 inches rise.

D. Abdominal and thoracic pressure; manometer re-adjusted before each experiment.

(a.) Arms rotated *inwards* = 8 inches rise.

(b.) Arms rotated *outwards* = 8 inches rise.

(Note 1.—Manometer readjusted midway.

Note 2.—This proves that the external or internal rotation of the arms is not of importance when enough force is applied to raise the shoulders, &c., to their highest possible position.)

3. *Marshall Hall*.—Repeated under the more favourable conditions of inflated lungs. Inspiration =  $\frac{1}{4}$  inch rise.

4. *Schultze*.—A. Body held in inspiratory position.

(a.) Expiration = oscillation.

(b.) Pressure on thorax and abdomen = oscillation.

B. Body held in expiratory position, manometer re-adjusted. Inspiration gradually increased up to 8 inches. Expiration restored level of fluid.

(Note.—At this point a leak occurred, necessitating the cessation of the experiment.)

		Maximum inspired.
Order 1. <i>Schultze</i>	}	8 inches (level never maintained with <i>Schultze's</i> method).
2 <i>Silvester</i> (forcible)		
3. <i>Marshall Hall</i>		$\frac{1}{4}$ inch.

EXP. 11.—Large male child, full time. Born January 1st, 1879, 10.30 a.m.; experiment January 3rd, 12 noon (49½ hours). Body very cold and stiff, thawed in hot bath. Manometer adjusted; lungs not inflated.

1. *Marshall Hall*.—(a.) Thoracic and abdominal pressure in prone position with a block under thorax produced ¼ inch fall.

(b.) Manometer readjusted, and pressure relaxed, fluid rose ⅓ inch.

(c.) Child turned into inspiratory posture, total rise = ⅔ inch rise.

(d.) Simple change of posture without previous pressure produced ¼ inch rise.

2. *Silvester*.—A. No previous pressure—inspiration.

(a.) Arms rotated *inwards* = total ⅔ inch rise.

(b.) Arms rotated *outwards* = 1 inch rise.

B. Pressure on thorax and abdomen, manometer readjusted.

(a.) Pressure simply relaxed = ⅓ inch rise.

(b.) Arms raised, rotated *inwards* = total ⅔ inch rise.

(c.) Arms raised, rotated *outwards* = total ⅓ inch rise.

c. Legs held and arms very forcibly elevated, after thoracic and abdominal pressure.

(a.) Arms rotated *inwards* = 10 inches rise.

(b.) Arms rotated *outwards* = 11 inches rise.

d. Legs held and arms very forcibly elevated without previous thoracic and abdominal pressure.

(a.) Arms rotated *inwards* = 9 inches rise.

(b.) Arms rotated *outwards* = 10½ inches rise.

(Note.—Manometer readjusted midway).

3. *Marshall Hall*.—Was tried again under the more favourable circumstances of the lungs having become expanded. Pressure on thorax and abdomen, manometer readjusted.

(a.) On relaxing pressure, rise = ¼ inch.

(b.) On turning child into inspiratory posture, total rise = ⅔ inch



4. *Schultze*.—A. Child being held in inspiratory position and manometer readjusted between the experiments.

(a.) Expiration gradually increased to  $3\frac{1}{2}$  inches fall.

(b.) Thoracic and abdominal pressure in supine posture produced  $2\frac{1}{4}$  inches fall.

B. Child held in expiratory posture, manometer readjusted; child then thrown into inspiratory posture. Inspiration = 7 inches. Expiration restored level of fluid.

c. The same experiment, the child being finally suspended by its arms (*Schultze-Silvester*). The total inspired was not increased = 7 inches.

	Maximum inspired.
Order 1. <i>Silvester</i> (forcible)	11 inches.
2. <i>Schultze-Silvester</i>	} 7    „
3. <i>Schultze</i>	
4. <i>Marshall Hall</i>	
	$\frac{7}{8}$ „

Exp. 12.—Full-grown female child. Delivered by forceps January 17th, 1879; experiment January 24th (7 days). Body, which was cold and stiff, was thawed in hot bath. Manometer adjusted; lungs not inflated.

1. *Marshall Hall*.—(a.) Thoracic and abdominal pressure applied in the prone position with a block under the thorax produced a very slight fall.

(b.) Manometer readjusted and pressure relaxed, rise of  $\frac{1}{8}$  inch.

(c.) Child turned into inspiratory posture; total rise = a little more than  $\frac{1}{8}$  inch.

(d.) Simple change of posture without previous pressure produced only slight oscillation.

2. *Silvester*.—A. No previous pressure on thorax or abdomen.

(a.) Inspiration (arms rotated *inwards*) =  $\frac{5}{8}$  inch rise.

(b.) Inspiration (arms rotated *outwards*) =  $\frac{1}{8}$  inch rise.

(Note.—Something seemed to be obstructing the air passages.)

B. Forcible elevation of the arms, legs being fixed.

(a.) Arms rotated *inwards*; the fluid rose on repeated attempts to 7 inches.

(b.) Arms rotated *outwards*; on repeated attempts fluid reached 8 inches.

(Note.—Manometer readjusted.)

c. Legs not fixed; pressure on thorax and abdomen preceding manipulations.

(a.) Pressure simply relaxed = slight oscillation.

(b.) Arms rotated *inwards* =  $\frac{3}{4}$  inch rise.

(c.) Arms rotated *outwards* =  $1\frac{1}{4}$  inch rise.

3. *Marshall Hall*.—Repeated after presumable expansion of lungs.

(a.) Pressure relaxed = oscillation.

(b.) Child turned into inspiratory posture =  $\frac{1}{8}$  inch rise.

4. *Schultze*.—A. Child held in inspiratory position. Expiratory movement caused fall, gradually increasing to  $1\frac{1}{2}$  inch.

B. Child held in expiratory posture and then thrown into inspiratory position. Inspiration after several attempts reached 7 inches, but not more than 2 inches was maintained; expiration restored level of fluid.

c. The same, the child finally suspended by its arms (*Schultze-Silvester*). No increase of air *permanently* retained, *i.e.* 2 inches.

Maximum inspired.

Order 1. *Silvester* (forcible) 8 inches.

2. *Schultze* 7 „ (level never maintained).

3. *Schultze-Silvester* 2 „

4. *Marshall Hall*  $\frac{1}{8}$  „

EXP. 13.—Large male child. Born February 26th, 1879, 6 a.m.; experiment February 28th, 12.30 p.m. (54½ hours). Body very cold and stiff, thawed in hot bath. *Mercury* manometer, no inflation of lungs.

1. *Marshall Hall*.—Thoracic and abdominal pressure applied in the prone position with a block under the thorax.

(a.) Pressure relaxed = slight oscillation.

(b.) Child turned into inspiratory posture = no increase of effect.

2. *Silvester*.—A. No previous pressure.

Inspiration.

(a.) Arms rotated *inwards* = slight oscillation.

(b.) Arms rotated *outwards* = slight oscillation.

B. With previous pressure. Nothing but slight oscillation produced.

c. Legs fixed, arms forcibly raised.

(a.) Arms rotated *inwards* =  $\frac{1}{2}$  inch rise.

(b.) Arms rotated *outwards* =  $\frac{1}{2}$  inch rise.

3. *Schultze*.—A. Inspiration repeated several times eventually produced a rise of more than 1 inch. Expiration restored level of fluid.

B. The same, the child finally suspended by arms. Inspiration = 1 inch (as before).

4. *Silvester*.—Repeated after some presumable expansion of lungs (legs fixed, arms forcibly raised), produced the same results as above (2 c).

N.B.—Mercury manometer.

	Maximum inspired.
Order 1. <i>Schultze</i>	} 1 inch.
2. <i>Schultze-Silvester</i>	
3. <i>Silvester</i> (forcible)	$\frac{1}{2}$ „
4. <i>Marshall Hall</i>	0

Exp. 14 (G.).—Male child, full time, breech presentation. Born November 30th, 1879, 8 a.m.; experiment December 1st, 1.30 p.m. (29½ hours). Body very cold and stiff, thawed before fire.

A. Manometer adjusted, no inflation of lungs. Long wooden pointer stuck into liver, to mark descent of diaphragm.

1. *Silvester* (Legs not held).—Inspiration =  $\frac{1}{4}$  inch. Pointer moves slightly upwards, apparently from traction of skin in elevating arms.

2. *Marshall Hall*.—Inspiration =  $\frac{1}{8}$  inch. No movement of pointer.

3. *Silvester* (forcible, legs held).—Inspiration = 6 inches. No movement of pointer.

4. *Schultze*.—Inspiration = 2 inches. Pointer moves decidedly upwards = descent of diaphragm.

a. To eliminate the action of the expansion of the thorax, a broad band of strapping was applied, completely encircling the chest.

1. *Silvester* (forcible).—Not more than 1 inch could be inspired.

2. *Schultze*.—Results = 0.

c. Strapping removed, lungs inflated; pointer moving strongly upwards.

1. *Silvester* (legs not held).—Inspiration = 3 inches.

2. *Silvester* (forcible, legs held).—Inspiration = 5 inches.

3. *Schultze*.—Inspiration = 2 inches; distinct upward movement of pointer.

d. Strapping reapplied.

1. *Silvester* (forcible).—Inspiration = 1 inch; pointer not moving.

2. *Schultze*.—Inspiration = 1 inch; pointer ascending.

Maximum inspired.

Order 1. *Silvester* (forcible) 6 inches.

2. *Schultze* 2 "

These results show that the maximum inspired under *Silvester's* system was far more affected by the presence or absence of the strapping than under *Schultze's* system; in other words, that some of the expansion of the lungs in *Schultze's* system is due to descent of the diaphragm.

Exp. 15 (H.).—Male child, placenta prævia. Born February 27th, 1880, 1.30 p.m.; experiment March 2nd, 2.30 p.m. (73 hours). Body very cold and stiff, thawed before fire and accidentally much scorched. Manometer adjusted. Lungs not inflated, but ineffectual attempts at artificial respiration had been made. A pointer was stuck into the liver.

1. *Pacini*.—A. (a.) Inspiration = 3 inches.

(b.) On raising the shoulders in a perpendicular direction the column sank, showing that the weight of the body of a child does not fix the trunk sufficiently.

(c.) On relaxing traction the fluid did not regain the level by  $\frac{1}{2}$  inch.

B. Manometer readjusted.

(a.) Inspiration = 3 inches.

(b.) On relaxing traction the fluid sank  $\frac{1}{2}$  inch below the level, showing an extra  $\frac{1}{2}$  inch to have been expired from the lungs.

c, d, e, f, precisely the same.

2. *Bain*.—Repeated experiments produced precisely the same results as the last experiments by Pacini's method.

3. *Schultze*.—Twelve experiments were tried; the amount inspired varied from 1 to 4 inches, the highest level being never maintained, the action being violent. The amount inspired was usually  $1\frac{1}{2}$  inch, and expiration usually carried fluid  $\frac{3}{4}$  inch below zero. The actual amount of change of level being thus  $2\frac{1}{4}$  inches. It was observed that when the weight of the body rested solely on the index fingers placed under the arms,  $\frac{1}{2}$  inch more was registered than when the other fingers supported the scapulæ. The pointer in the liver showed the diaphragm to descend by Schultze's method only.

4. *Silvester* (feet fixed).—(a.) Inspiration = 3 inches. Expiration =  $\frac{1}{2}$  inch below zero.

(b.) Inspiration = 3 inches. Expiration =  $\frac{1}{2}$  inch above zero.

Ten more experiments were tried, the amount inspired gradually diminishing, the pectoral muscles, which had been severely scorched, gradually giving way.

Order 1. *Schultze*

Maximum inspired.

4 inches (level never maintained).

2.  $\left\{ \begin{array}{l} \text{Bain} \\ \text{Pacini} \\ \text{Silvester (forcible)} \end{array} \right\} 3 \text{ inches.}$

EXP. 16 (I).—Male child, stillborn at full time, accidental hæmorrhage. Born May 1st, 1880; experiment May 4th (about 72 hours). Manometer adjusted. Lungs not inflated.

1. *Pacini* (feet fixed).—A. (a.) Inspiration = 6 inches.

(b.) On raising the arms perpendicularly from the table the column sank (the weight of the body producing little effect).

(c.) On relaxing traction the column remained  $2\frac{1}{4}$  inches above zero.

B. Manometer readjusted.

(a.) Inspiration = 5 inches,  $2\frac{1}{4}$  inches having remained in lungs from last experiment.

(b.) On relaxing traction the column remained  $1\frac{1}{4}$  inch above zero.

c. Manometer readjusted. Three experiments produced identical results with those just described (b).

(c.) Inspiration = 5 inches.

(d.) On relaxing traction the column remained  $\frac{1}{4}$  inch above zero.

Three experiments produced identical results with those just described (c, d).

(e.) Inspiration = 5 inches.

(f.) Traction relaxed, level of fluid fell  $\frac{1}{4}$  inch below zero.

Three experiments produced an inspiration of 5 inches, the column falling on relaxing traction to zero, or nearly.

2. *Bain*.—1st method produced precisely the same results as the later *Pacini* experiments (see above), repeated twelve times. 2nd method gave no results whatever.

3. *Schultze*.—Child held in expiratory posture, and manometer readjusted before each experiment.

(a.) Insp. = 2 inches. Exp. = 1 inch below zero.

(b.) „ = 2 „ „ =  $\frac{1}{2}$  „ „

(c.) „ =  $1\frac{1}{2}$  „ „ = zero.

(d.) „ = 4 „ „ =  $\frac{1}{2}$  inch below zero.

(e.) „ =  $4\frac{1}{2}$  „ „ = zero.

(f.) Insp. =  $3\frac{1}{2}$  inches. Exp. = zero.

(g.) " = " " " " " " "

(h.) " = " " " " " " "

(i.) " = " " " " " " "

(j.) " = " " " " " " "

(k.) " = " " " " " " "

(l.) " = " " " " " " "

The highest level on inspiration was never maintained.

4. *Silvester* (feet fixed).—Manometer readjusted after each experiment. (a.) Inspiration = 4 inches. Expiration =  $\frac{3}{4}$  inch above zero.

(b.) Inspiration = 4 inches. Expiration = zero.

(c.) Inspiration = 6 inches. Expiration =  $1\frac{1}{2}$  inch above zero.

(d.) Three experiments gave, inspiration = 6 inches. Expiration gradually sank from  $1\frac{1}{2}$  inch above zero to zero.

(e.) Five experiments produced, inspiration = 6 inches. Expiration = zero.

(N.B.—The later experiments would give no suspicion of pneumothorax, which was nevertheless present.)

Maximum inspired.

Order 1. *Silvester* (forcible) 6 inches.

2. { *Pacini* } 5 "   
 { *Bain* }

3. *Schultze*  $4\frac{1}{2}$  " (level not maintained).

Exp. 17 (J).—Male child, full time, accidental hæmorrhage. Born May 14th, 11 a.m.; experiment May 15th, 1 p.m. (26 hours). Manometer adjusted. Lungs not inflated.

1. *Pacini*.—(a.) Inspiration = 6 inches. Expiration =  $\frac{3}{4}$  inch above zero.

(b.) Inspiration = 11 inches (manometer readjusted in middle of experiment).

(c.) Inspiration = 9 inches. Expiration = 4 inches above zero.

(d.) Inspiration = 5 inches. Expiration = 1 inch below zero.

- (e.) Inspiration = 6 inches. Expiration = zero.
  - (f.) On pressing abdomen column fell 4 inches below zero (*i.e.* total change = 10 inches).
  - (g.) Inspiration =  $5\frac{1}{2}$  inches. Expiration = zero.
  - (h.) On pressing abdomen column fell 3 inches below zero (*i.e.* total change =  $8\frac{1}{2}$  inches).
  - (i.) Inspiration = 5 inches. Expiration = 2 inches above zero.
  - (j.) Abdominal pressure depresses column to 5 inches below zero (*i.e.* total change = 10 inches).
- (*Note.*—This method was repeated with the following alteration; the operator stood facing the subject and forced up the shoulders from below. The results were equally good.)
2. *Bain.*—(a.) Inspiration = 10 inches. Expiration = zero.
- (b.) Inspiration = 6 inches. Expiration = 1 inch above zero.
  - (c.) Abdominal pressure depresses column 7 inches (*i.e.* total change 12 inches).
  - (d.) Inspiration = 0 (canula having become temporarily occluded by pressing against posterior wall of trachea).
  - (e.) Inspiration = 8 inches. Expiration = 2 inches below zero.
  - (f.) Abdominal pressure depresses column 4 inches (*i.e.* total change 14 inches).
  - (g.) Inspiration =  $9\frac{1}{4}$  inches. Expiration =  $1\frac{1}{4}$  inch below zero.
  - (h.) Abdominal pressure depresses column 5 inches (*i.e.* total change 16 inches).
  - (i.) Inspiration = 8 inches. Expiration = 1 inch below zero.
  - (j.) Abdominal pressure depresses column 5 inches (*i.e.* total change = 14 inches).
  - (k.) Inspiration = 8 inches. Expiration =  $1\frac{1}{4}$  inch below zero.
  - (l.) Abdominal pressure depresses column 3 inches (*i.e.* total change =  $12\frac{1}{2}$  inches).



3. *Silvester* (feet fixed).—(a.) Inspiration = 5 inches. Expiration =  $3\frac{1}{2}$  inches above zero. Abdominal pressure depresses column 8 inches (*i.e.* total change =  $16\frac{1}{2}$  inches).

(b.) Inspiration = 9 inches. Expiration = 1 inch below zero. Abdominal pressure depresses column 6 inches (*i.e.* total change = 16 inches).

(c.) Inspiration = 9 inches. Expiration = 1 inch below zero. Abdominal pressure depresses column 5 inches (*i.e.* total change = 15 inches).

(d.) Inspiration = 9 inches. Expiration = 1 inch below zero. Abdominal pressure depresses column 5 inches (*i.e.* total change = 15 inches).

4. *Schultze*.

(a.) Inspiration = 1 inch. Expiration = zero.

(b.)       "       = 2       "       "       = "

(c.)       "       = 3       "       "       = "

(d.)       "       = 4       "       "       = "

(e.)       "       = 2       "       "       = "

(f.)       "       = 3       "       "       = "

(g.)       "       = 3       "       "       = "

(Highest level never maintained.)

	Maximum inspired.
Order 1. Pacini	11 inches.
2. Bain	10       "
3. Silvester (forcible)	9       "
4. Schultze	4       " (level never maintained).

EXP. 18 (K).—Male child, full time; presentation of hand, foot, and cord in a contracted pelvis; turning, dislocation of vertebræ at root of neck. Born May 27th, 1880, 6 p.m.; experiment May 29th, 10.30 a.m. ( $40\frac{1}{2}$  hours). Manometer adjusted. Lungs not inflated.

1. *Bain-Pacini*.—(The methods being practically identical both in manipulation and results were classed together; the point being that, the feet being fixed, the shoulders were raised directly instead of—as in Silvester's

method—indirectly. Manometer was readjusted after each experiment.)

(a.) Insp. = 5 inches. Exp. =  $\frac{1}{2}$  inch above zero.

(b.) „ = 5 „ „ =  $\frac{1}{2}$  „

(c.) „ = 3 „ „ =  $\frac{1}{2}$  below

(d.) „ = 2 „ „ =  $\frac{1}{2}$  above

(e.) „ = 2 „ „ =  $\frac{1}{2}$  „

(f.) „ = 1 „ „ =  $\frac{1}{8}$  „

(g.) Abdominal pressure depresses column  $1\frac{1}{2}$  inch.

(h.) Insp. = 2 inches. Exp. =  $\frac{1}{2}$  inch above zero. Abdominal pressure depresses column 1 inch (*i.e.* total change  $2\frac{1}{2}$  inches).

The experiments seemed to fail from giving way of the pectoral muscles.

2. *Schüller*.—Elevating the ribs caused depression of the column, the ribs could not be elevated without the liver.

3. *Schultze*.

(a.) Insp. = 1 inch. Exp. = zero.

(b.) „ =  $1\frac{1}{2}$  „ „ = „

(c.) „ =  $1\frac{1}{2}$  „ „ = „

(d.) „ = 2 „ „ =  $\frac{1}{2}$  inch above zero.

(e.) „ =  $1\frac{1}{4}$  „ „ =  $\frac{1}{2}$  „

(f.) „ =  $2\frac{1}{4}$  „ „ =  $\frac{1}{2}$  „

(Note.—Highest level never maintained.)

Repeated experiments produced inspiration gradually reaching  $3\frac{1}{2}$  inches, after which the attempts began to fail. Pneumothorax being found at the autopsy.

Maximum inspired.

Order 1. Bain-Pacini 5 inches.

2. Schultze  $2\frac{1}{4}$  „ (not maintained).

3. Schüller fall in every case.

Exp. 19. (L.).—Female child. Born June 16th, 1880, 6 p.m.; experiment June 17th, 3.30 p.m. ( $21\frac{1}{2}$  hours). Manometer adjusted. Lungs not inflated.

1. *Bain-Pacini*.—(a.) Inspiration = 3 inches. Expiration = zero.

(b.) Inspiration=4 inches. Expiration= $\frac{1}{2}$  inch below zero. Abdominal pressure depressed level  $\frac{3}{4}$  inch (i.e. total change  $5\frac{1}{4}$  inches).

(c.) Inspiration=4 inches. Expiration = zero. Abdominal pressure depressed level 1 inch (i.e. total change = 5 inches). Manometer readjusted.

(d.) Inspiration=4 inches. Expiration= $\frac{1}{2}$  inch above zero. Abdominal pressure depressed level 1 inch (i.e. total change= $4\frac{1}{2}$  inches). Manometer readjusted.

(e.) Inspiration = 3 inches. Expiration = zero. Abdominal pressure depressed level 2 inches (i.e. total change = 5 inches). Manometer readjusted.

(f.) Inspiration = 4 inches. Expiration=zero. Abdominal pressure depressed level  $\frac{1}{4}$  inch (i.e. total change =  $4\frac{1}{4}$  inches).

2. *Silvester* (forcible).—Manometer readjusted each time.

(a.) Inspiration =  $4\frac{3}{4}$  inches. Expiration=zero. Abdominal pressure depressed level  $\frac{1}{4}$  inch more (i.e. total change=5 inches).

(b.) Inspiration = 5 inches. Expiration = zero. Abdominal pressure depressed level  $\frac{3}{4}$  inch more (i.e. total change= $5\frac{3}{4}$  inches).

(c.) Inspiration = 5 inches. Expiration = zero. Abdominal pressure depressed level  $\frac{1}{2}$  inch more (i.e. total change =  $5\frac{1}{2}$  inches).

(d.) Inspiration = 5 inches. Expiration = zero. Abdominal pressure depressed level  $\frac{1}{2}$  inch (i.e. total change =  $5\frac{1}{2}$  inches).

(e.) Inspiration = 5 inches. Expiration = zero. Abdominal pressure depressed level  $\frac{1}{4}$  inch (i.e. total change =  $5\frac{1}{4}$  inches).

(f.) Inspiration = 5 inches. Expiration = zero. Abdominal pressure depressed level  $\frac{1}{4}$  inch (i.e. total change =  $5\frac{1}{4}$  inches).

3. *Schücking*.—Repeated experiments in which Silvester's and Schücking's methods were tried alternately, and also in which the arms were first raised, and then slightly

abducted; and thirdly first abducted and then raised simply, showed abduction to be of no additional value.

Thus Schücking's modifications possess no advantage over Silvester's original directions.

With regard to *flexion of the legs*, rather more air was inspired when the legs were straight than when they were flexed.

It is probable that this is due to the fact that where there is no opisthotonos there is no excessive tension on the anterior body walls.

#### 4. *Schultze*.

(a.)	Insp.	= 3 inches.	Exp.	= zero
(b.)	"	4 "	"	= "
(c.)	"	3 "	"	= "
(d.)	"	4 "	"	= "
(e.)	"	4½ "	"	= "
(f.)	"	5 "	"	= "

(Highest level never maintained).

Maximum inspired.

Order 1.	{	Schultze <sup>1</sup> Silvester <sup>2</sup> (forcible) Schücking	}	5 inches.
2.		Bain-Pacini		4 inches.

Exp. 20 (M.).—Male child, apparently full time; flooding. Born July 5th, 1880. 1 a.m.; experiment July 5th, 2 p.m. (37 hours). Manometer adjusted. Lungs carefully inflated.

1. *Bain-Pacini*.—Manometer readjusted each time. No abdominal pressure used.

(a.)	Insp.	= 6 inches.	Exp.	= ½ inch below zero.
(b.)	"	= 6 "	"	= ½ "
(c.)	"	= 6 "	"	= ½ "
(d.)	"	= 7 "	"	= ½ "
(e.)	"	= 5 "	"	= ¼ "
(f.)	"	= 5 "	"	= ¼ "

<sup>1</sup> Highest level never maintained.

<sup>2</sup> The highest level of 5 inches was reached once by Schultze's method, five times by Silvester's.

(g.) Abdominal pressure depressed level two inches more (*i.e.* total change  $7\frac{1}{4}$  inches).

2. *Silvester*.—No abdominal pressure used, feet held.

(a.) Insp.=6 inches. Exp.=zero.

(b.) „ =6 „ „ = „

(c.) „ =6 „ „ = „

(d.) „ =7 „ „ = „

(e.) „ =6 „ „ = $\frac{1}{4}$  inch below zero.

(f.) „ =6 „ „ = $\frac{1}{4}$  „

(g.) Abdominal pressure depressed level 1 inch (*i.e.* total change= $7\frac{1}{4}$  inches).

3. *Schücking*.—Six experiments tried ; in all inspiration =5 inches. Expiration=zero.

		Maximum inspired.
Order 1.	{ Bain-Pacini Silvester (forcible) }	7 inches.
2.	Schücking	5 inches.

*Summary of results.*

	Maximum in inches.		Maximum in inches.
<b>EXPERIMENT 1.</b>		<b>EXPERIMENT 12.</b>	
1. Schultze-Silvester.....	4½	1. Silvester (forcible) .....	8
2. Silvester.....	2	2. Schultze.....	7
3. Schultze .....	1	3. Schultze-Silvester.....	2
4. Marshall Hall .....	½	4. Marshall Hall .....	½
5. Schroeder .....	0		
<b>EXPERIMENT 3.</b>		<b>EXPERIMENT 13 (Mercury).</b>	
1. Silvester .....	2	1. Schultze.....	1
2. Schultze-Silvester.....	1½	2. Schultze-Silvester.....	1
3. Schultze.....	1	3. Silvester (forcible) .....	½
4. Marshall Hall .....	½ (+)	4. Marshall Hall .....	0
5. Howard .....	½		
6. Schroeder .....	0	<b>EXPERIMENT 14.</b>	
<b>EXPERIMENT 4.</b>		1. Silvester (forcible) .....	6
1. Schultze-Silvester.....	1½	2. Marshall Hall .....	½
2. Schultze.....	1	3. Schultze.....	2
3. Howard .....	½ (+)		
4. Marshall Hall .....	½	<b>EXPERIMENT 15.</b>	
5. Silvester .....	0	1. Schultze.....	4
6. Schroeder .....	0	2. Bain .....	3
<b>EXPERIMENT 5.</b>		3. Pacini .....	3
1. Schultze-Silvester.....	4	4. Silvester (forcible) .....	3
2. Schultze } .....	2½		
3. Silvester } .....	2½	<b>EXPERIMENT 16.</b>	
4. Schroeder } .....	0	1. Silvester (forcible) .....	6
5. Marshall Hall } .....	0	2. Pacini.....	5
		3. Bain .....	5
<b>EXPERIMENT 6.</b>		4. Schultze.....	4½
1. Silvester (forcible) .....	4½		
2. Schultze .....	4½	<b>EXPERIMENT 17.</b>	
3. Schultze-Silvester .....	2½	1. Pacini .....	11
4. Schroeder .....	0	2. Bain .....	10
5. Marshall Hall .....		3. Silvester (forcible) .....	9
6. Howard .....		4. Schultze.....	4
<b>EXPERIMENT 9.</b>			
1. Silvester (forcible) .....	8	<b>EXPERIMENT 18.</b>	
2. Schultze-Silvester.....	7	1. Bain-Pacini .....	5
3. Schultze.....	5½	2. Schultze.....	2½
4. Marshall Hall .....	½	3. Schüller.....	0
5. Howard .....	½		
<b>EXPERIMENT 10.</b>		<b>EXPERIMENT 19.</b>	
1. Schultze.....	8	1. Schultze.....	5
2. Silvester (forcible) .		2. Silvester (forcible) .....	
3. Marshall Hall .....	½	3. Schücking.....	4
<b>EXPERIMENT 11.</b>		4. Bain-Pacini .....	4
1. Silvester (forcible) .....	11		
2. Schultze-Silvester.....	7	<b>EXPERIMENT 20.</b>	
3. Schultze..	7	1. Bain-Pacini .....	7
4. Marshall Hall .....	½	2. Silvester (forcible) .....	
		3. Schücking.....	5

NOTE.—“Silvester (forcible)” implies the fixation of the feet.

*Remarks.*

The results of seventeen experiments are recorded, the remaining three experiments having failed.

The summary of results in each case has been determined not on the principle of average results, but of maximum effect produced.

To either method objections may be urged :

(a.) To the system of registering maximum effect, the objection seems to be that such maximum effect may have been produced in one solitary instance. A perusal of the experiments will set this right.

(b.) To the system of registering averages, the objection seems to be that the average amount of effect produced does not really represent the series of experiments unless these are more or less uniform, while a casual failure may bring down the average unfairly.

The determination of the value of the various methods of artificial respiration is a task which is eminently unsuited for rigid numerical statistics, even with regard to the small portion of the subject now under consideration.

It is plain from the foregoing experiments that some of the subjects afforded far better results than others ; the difference being in some cases due to the development and rigidity of the thoracic walls (which vary greatly even in mature children) ; in others to the presence or absence of mucus in the air-passages, and also no doubt in some cases to the state of preservation. In determining the relative value of the different methods, such subjects as gave high results are plainly much better guides than those which gave low results.

On looking at the table of results, it will be seen that the earlier experiments eliminated three methods as practically useless, viz. those of Schroeder, Howard, and Marshall Hall.

1. *Schroeder*.—This method seems to be based on the *a priori* reasoning that the capacity of a flexible cylinder increases when it is curved, provided that the concave side is not collapsed.

For instance, the capacity of such an instrument as a concertina, to the projecting rings of which a piece of whalebone had been fastened on one side, would be increased by curving it so as to make its outline convex on the side opposite to the whalebone.

In the body of a child, the spinal column would represent the whalebone, and the ribs the rings.

The reasons why the method fails are :

1st. That the anterior body walls become tense and approximated to the spine when the body is bent into a position of opisthotonos, the capacity of the thorax and abdomen becoming diminished.

2nd. That the ribs are not rigid even in children which have breathed.

3rd. But the principal reason lies in the fact that in children which have never breathed, the position of the thorax is one of *expiration*, and not of *inspiration*; the thoracic walls are completely collapsed, and there is no thoracic cavity or cylinder to deal with. There is nothing to procure descent of the diaphragm, and the thoracic cavity cannot be expanded in any direction by such means.

2. *Howard*.—The above fact of the collapsed state of a child's chest which has never breathed, sufficiently explains the failure of this method. Indeed, for such children certainly, and for all new-born children probably, "Howard's method" (sc. of artificial inspiration) does not exist. For adults the matter is different; in them the position of thoracic equilibrium is one of moderate inspiration, the chest walls are moreover capable of elastic recoil, and the manœuvre repeats the mechanism of respiration in birds, in which expiration requires the expenditure of vital force, inspiration being accomplished by the elastic recoil of the chest walls.



The method ought never to have been made to include stillborn children.

3. *Marshall Hall*.—The above remarks apply to this method also, which may be said to have been proved incapable of producing inspiration.

4. *Schüller*.—This method is incapable of producing inspiration; the ribs are hard to separate from the liver, and their want of firmness prejudices any effect which might otherwise be produced; moreover, groping with the finger-tips between the ribs and surface of the liver is a proceeding not altogether without risk. The bent position of the legs was shown (Exp. 19) to be of no additional value, it being probable that in the absence of opisthotonos there is no excessive tension of the anterior abdominal walls which needs avoiding.

We are left, therefore, with Silvester's method (and its modifications by Pacini, Bain, and Schücking) and Schultze's method.

The earlier experiments plainly showed that the weight of a child's body is not sufficient counterpoise to the necessary traction in Silvester's method. In all but the first few cases the feet were fixed, and only in these cases are the results compared with those of other methods. We shall first deal purely with the amount of air inspired by these different methods; reserving our remarks on their mode of action and the small details to be observed in their employment.

It will be seen that in the great majority of cases in which Schultze's method came into competition with Silvester's or its modifications, it produced less effect (Experiments 6, 9, 11, 12, 14, 16, 17, 18); in two cases Schultze's method produced the greatest result (Experiments 13, 15); in two cases the results of Schultze's method equalled those of Silvester's or its modifications (Experiments 10, 19).

It remains then to compare with each other Silvester's method and its modifications. This was done in five experiments (15, 16, 17, 19, 20).

Pacini's and Bain's methods proved practically identical and will be considered together.

Schücking's method proved practically identical with Silvester's and will be considered together with it.

Silvester's (and Schücking's) methods produced more results than Pacini's and Bain's in two cases (Experiments 16, 19).

Pacini's and Bain's produced more results in one case (Experiment 17).

The results were identical in two cases (Experiments 15, 20).

The practical result is that, provided the feet are fixed and the body properly laid, the mode of seizure (by arms or shoulders) is a matter of no moment.

We now come to the consideration of the mode of action of these methods and of some of the details of their execution.

5. *Schücking*.—This method was tested in Experiment 19, and found to possess no advantage over Silvester's.

6. *Silvester*.—The principle underlying this method and its modifications is the elevation of the ribs, clavicle, and sternum, and consequent enlargement of the cavity of the chest.

It is to be remarked that this group of manipulations, which produces the greatest amount of ventilation, in no way resembles the normal respiration of a child which is almost purely diaphragmatic.

It was shown (by Experiments 9, 10, 11, 12, 13) that, in the absence of very violent traction, the position of the arms is of much importance; the effect produced when the arm is everted being more than twice as great as when the arm is inverted. This is no doubt due to the mode of insertion of the pectoralis major muscle into the outer lip of the bicipital groove; eversion naturally renders this more tense. Silvester gives no directions with regard to this point. The arms should certainly be seized above the elbow.

The block beneath the shoulders should only be just so

high as to prevent the chin from falling or being bent forwards on the breast; opisthotonos impedes ventilation by tension of the anterior body walls and their consequent approximation to the spine.

7. *Pacini-Bain*.—These methods being essentially identical are considered together. The mode of seizure of the shoulders was shown to be unimportant.

The amount of ventilation produced proved to be, to all practical intent, identical with that produced by Silvester's method.

One small disadvantage seems to be that the operator does not face the subject's face, but views it upside down. This is a matter not directly germane to the present enquiry, but it was thought well to test the question whether an equal amount of ventilation could be procured by reversing the action and elevating the shoulders from below, the operator facing the subject. This was answered affirmatively by Experiment 17, note.

The latter half of Pacini's method and Bain's second method, consisting in raising the arms from the ground and using the weight of the body as a counterpoise, are inapplicable to new-born children, the weight of the body being insufficient to fix it against the traction of the operator (Experiments 15, 16).

In one case the pectoral muscles seemed to give way under the Pacini-Bain manipulations, as if exposed to greater tension than by the Silvester method (Experiment 18).

8. *Schultze*.—In this most ingenious method the shoulder is grasped as in Pacini's method, the ribs, clavicles, and sternum are elevated as in Silvester's method and its modifications (especially Pacini's method), but the counterpoise, or rather the force, is furnished by the action of gravity and so-called centrifugal force, which not only procure elevation of the anterior and upper thoracic walls, but also descent of the diaphragm.

This method, being hard to describe, somewhat com-

plicated, and almost never practised in England, requires special notice.

In the first place the seizure of the shoulders is a most important point, the object being to throw the weight at the end of the inspiratory movement entirely upon the index fingers placed in the axillæ. Attention is directed to this point in Experiment 15, where it is shown that on it depends the entrance of a considerable amount of air. No weight should be supported by the other fingers lying on the back of the thorax.

Again, the violence of its action was noteworthy; the fluid rose violently in the manometer, and never maintained the highest level reached. The following will show the difference between the levels reached and the levels maintained:

Experiment 6 (*a*), 1 inch to  $\frac{1}{2}$  inch; (*b*), 4 inches to  $1\frac{1}{4}$  inch; Experiment 12 (*b*), 7 inches to 2 inches.

This remarkable fact requires consideration. The rapid jerk with which the fluid fell implies some elastic recoil, either of the chest walls or lung tissue. No recoil of the chest walls was observed, and there are other reasons for thinking that the cause was over-distension of the lung tissue. One reason for thinking this is that it was usually during the Schultze manipulations that the sucking noise was heard at the root of the neck, which was found to have been due to entrance of air beneath the deep cervical fascia into the anterior mediastinum, and sometimes into the pleura. This subject will receive attention hereafter, the only point here insisted on being that this can only be explained by a greater expansion of the chest walls than the lungs were capable of following, and consequent entrance of air into the thoracic cavity by the route of least resistance.

It must be remembered that a small plug of mucus is sufficient to occlude a comparatively important bronchus in a child, and it is suggested that in the presence of a very rapid and powerful blast into the lungs, a neighbouring lobule or bronchus (with its now very delicate

walls) may rapidly dilate and press upon the original seat of obstruction, thus completing the occlusion. Under such circumstances the conditions would correspond with those of collapse of part of the lungs with violent inspiratory efforts, which always procure over-distension of other parts of the lungs. Some such explanation seems needed when we remember the incomplete expansion of the lungs proved by dissection. This is a circumstance which, it must be owned, is not in favour of the method.

It must be observed that this may produce the retraction of the abdomen observed by Behm, just as much as occlusion of the glottis by the tongue may produce it.

Schultze's claim to have detected small atelectasies, and to have proved their removal by percussion several days after birth, should be considered in the presence of the actual lungs of a stillborn child. ('Der Scheintod Neugeborener,' p. 172).

In the course of the experiments it suggested itself to try suspending the child by its arms instead of by its armpits. Such experiments are designated "*Schultze-Silvester*" in the descriptions. It was found that more air was introduced in this way than by Schultze's method, no doubt from greater tension of the pectoral muscles and greater elevation of the shoulders.

The manœuvre is hardly one which could be safely applied to a slippery living child. It is, however, of interest in itself.

The question of the actual descent of the diaphragm was tested by passing a pointer through the abdominal walls into the liver. Descent of the diaphragm naturally implies descent of the liver and ascent of the pointer.

Schultze's method certainly procures descent of the diaphragm, as will be seen from Experiments 14 and 15. No other method does this.

How much ventilation is due to descent of the diaphragm?

Experiment 14 was designed with a view to answering this question. A broad band of strapping was tightly

applied to the thorax so as to completely encircle it, with a view to preventing its expansion ; it was afterwards removed, then reapplied, and the results compared. It is almost needless to say that the strapping seriously hindered the action of Silvester's method, reducing the column of fluid from 6 inches to 1 inch, although much force was applied.

Schultze's method raised a column of 2 inches before the strapping was applied ; after the application of the strapping the results became *nil*. The strapping was then removed, and a column of 2 inches raised again. On reapplying the strapping a column of 1 inch was raised, the pointer indicating some descent of the diaphragm.

On blowing directly into the lungs the pointer moved far more than it ever did with Schultze's method. The diaphragm then does descend in Schultze's method, but ventilation depends probably far more on elevation of the ribs, &c., as in other methods.

It is very remarkable how much ventilation is effected by Silvester's method and its modifications, when it is remembered that it is procured by a mode utterly unlike the natural respiration of a new-born infant.

While these experiments were still proceeding, a valuable paper appeared from the pen of Carl Behm ("Die verschiedenen Methoden der kunstlichen Athmung bei Asphyctischen Neugeborenen," 'Zeitschrift für Geburtshülfe und Gynäkologie,' Band v, Heft i, 1880, p. 36). His conclusions are founded on experiments performed on six subjects, only three of whom had never breathed, and in one of the latter the experiments failed. They therefore depend on six cases, only two of which fulfil the necessary conditions.

In some cases his conclusions agree with mine ; in some they differ essentially ; a difference which I believe to be due to the facts above mentioned. The essential difference between the conditions of equilibrium of a child's chest before it has breathed and after cannot be too strongly insisted upon. This difference is probably

established in a very short time after birth, and entirely alters the conditions, especially with regard to the first group of methods, depending on elastic recoil of the chest walls (Marshall Hall, and Howard).

It will be seen that both these methods in my cases amounted to absolute failures, while in Behm's cases they several times surpassed other methods (as those of Schultze, Silvester, and its modifications). If we look, however, at the only two of his cases which concern still-born children who had never breathed (Cases 2 and 6), we find that in Case 2 Marshall Hall's method gave no results (Howard's not being tried); and that in the other case (Case 6) Marshall Hall's and Howard's methods produced hardly any result, standing at the bottom of the list, with the exception of Schüller's method, which is valueless.

Of his other cases the following were the ages at death :—Case 1, one month; Case 3, one day; Case 4, nine days. In two of these cases (1 and 3) the elasticity of the ribs is described as "good," in the other (Case 4) as "weak."

Attention should be especially called to the fact that a child's thorax can be fairly resilient a day after birth. But the question is not what results would be obtained even so short a time as a day after birth, but what amount of ventilation each method will produce in a child which has never breathed. No doubt all methods are far less efficacious in ill-developed and premature, than in well-developed and mature, children.

We therefore venture to think that if Behm's cases are properly considered, they tell in favour of the view above enunciated, that all methods depending on the elastic recoil of the chest walls are useless when applied to really stillborn children as means of ventilation of the lungs.

It must always be remembered that a great source of difficulty in the living child (the patency of the air-passages) is secured in these experiments by tracheotomy; and this point has to be considered in choosing a method

or methods for the recovery of a stillborn child, a question which is far from being settled by the present purely experimental inquiry.

Behm recommends (p. 44) the legs to be bent and the feet not fixed (as recommended by Schüller). The bending of the legs I have shown to be of no moment (Experiment 19), the fixation of the legs I have proved to be quite necessary to produce considerable effect.

Behm found, as I did, the Silvester group of manipulations capable of producing greater ventilation than that of Schultze.

It is easily intelligible that the fact of real still-birth in the subjects experimented on would affect these far less than the methods of Marshall Hall and Howard, and indeed, be perhaps in their favour.

The methods of faradisation of the phrenic nerves (Hufeland, 'Dissertatio vir. electr. in Asphyxia.' Göttingen, 1793) (and that of Woillez, 'Du Spirophore, appareil de sauvetage pour le traitement de l'Asphyxie.' Paris, 1876; 'Bulletin de l'Acad. de Méd.,' Nos. 25, 31, 32, 36, 37, 38; 'Comptes Rend.,' lxxxii, p. 1447), the principle of which is alternate rarefaction and condensation of the air in the receiver of an air-pump in which the patient is immersed up to the neck, have not been included, the first because it cannot be tried on dead bodies, the second because it requires a large and elaborate apparatus which renders it practically useless.

### *Conclusions:*

The following conclusions are offered :

1. Since the position of equilibrium of a stillborn child's chest is one of absolute expiration, airlessness, or collapse; no method which depends on elastic recoil of the chest walls will introduce air into its lungs. The methods of Marshall Hall and Howard are useless as means of directly ventilating the lungs of stillborn children.

2. Silvester's method and its modifications by Pacini



and Bain introduce more air into the lungs than any other method.

3. In using Silvester's method the arms should be held above the elbows and everted.

4. In using Pacini's or Bain's method the legs should be fixed, the second half of Pacini's method and Bain's second method should not be employed, as the weight of a new-born child's body is insufficient counterpoise to the necessary traction.

5. In using these two latter methods, the operator may face the subject, and lift the shoulders from below ; by this means he is able to watch the child's countenance, and is able to introduce an equal quantity of air.

6. Schücking's method is no improvement on Silvester's.

7. Schüller's method is useless and not free from risk.

8. Schroeder's method is useless.

9. Schultze's plan, although its power of ventilation is less than that of Silvester and its modifications, yet acts efficiently.

10. In Schultze's method the diaphragm does descend though but slightly ; its principal action, however, is on the thoracic walls as in the Silvester group.

11. In Schultze's method it is important that the whole weight should rest (at the end of the inspiratory movement) on the index fingers in the axillæ, and should not be distributed to the other fingers.

12. The violence of the action of the method of Schultze is not in its favour.

13. Opisthotonos always produces expiration by tension of the anterior body walls, and should be avoided.

It has been thought unnecessary to include statistics with regard to the expiratory force of each method ; considering that direct pressure amounting to any desired force can be applied in all cases where the posture is horizontal. The method of Schultze possesses considerable expiratory force.

SECOND COMMUNICATION  
ON  
ARTIFICIAL RESPIRATION IN STILL-  
BORN CHILDREN.

THE EXPANSIBILITY OF VARIOUS PARTS OF  
THE LUNGS.

AN EXPERIMENTAL INQUIRY.

BY

FRANCIS HENRY CHAMPNEYS, M.A., M.B. OXON.,  
M.R.C.P., F.L.S.,  
ASSISTANT LECTURER ON MIDWIFERY, ETC., AT, AND ASSISTANT OBSTETRIC  
PHYSICIAN TO, ST. GEORGE'S HOSPITAL.

(Received March 18th—Read April 26th, 1881.)

*Preface.*

THE present communication being one of a series on the subject of Artificial Respiration in Stillborn children proposes to deal with the question, “~~which~~ <sup>what</sup> part of the lungs of a child which has been subjected to various methods of manipulation with this object is most frequently expanded and which most frequently unexpanded?”

It would have been interesting to answer this question for each separate method, but material is not plentiful

enough. Nothing short of a series of observations on the appearances in a considerable number of cases manipulated by each method would suffice for a satisfactory answer to this subdivision of the question.

Moreover, it is probable that all the methods which are effectual in producing inspiration would be found to produce aëration of very much the same parts of the lungs, since they all act principally in the same way, namely by raising the ribs, clavicles, and sternum.

Even the method of Schultze, which does produce some descent of the diaphragm, still acts principally in the same way as the Silvester group, as I have elsewhere shown.

It would also be very interesting to determine the order in which various parts of the lungs become expanded by inspiring any desired quantity of air.

Unfortunately this is beyond our power; the bodies of stillborn children possess (so to say) individual peculiarities, and some lend themselves much more favourably to experiments than others.

It would have been easy to remove the respiratory organs or open the thorax, and force a measured quantity of air into the chest, observing the order of expansion of the several parts, but the conditions would be so essentially changed, both as regards the method of aëration and the surroundings of the lungs, that the similarity between artifice and nature would cease, and the investigation possess little probable and absolutely no demonstrable value.

This question, however, is more or less elucidated by the following experiments, in which the amount of air changed can be compared with the condition of the lungs as shown by dissection.

In the first table the first column shows the reference to the experiment, the second the methods of manipulation employed, the third the amount of air changed, and the fourth the conditions of the thorax as shown by dissection.

With regard to the amount of air changed, it may be necessary to say that where abdominal and thoracic pressure was employed for the purpose of expelling as much air as possible, the amount of aëration is calculated from the air they expelled as well as from the height of the column of fluid drawn up by inspiration.

This air is of course not under equal pressure, as would have been the case with a spirometer, but the figures are sufficiently near to give an idea of the amount of air received by the lungs in each case.

It may be added that the experiments were instituted with a view to ascertaining the inspiratory value of the different methods, and have been utilised for the present inquiry.

The use of a spirometer would have prevented several important observations, such as the force with which the air is inspired under Schultze's method.

Although twenty-six subjects were experimented on, only such experiments as refer to our subject are here recorded; and no case has been quoted in which direct inflation of the lungs was practised.

The observations quoted are twelve in number.

The second table, referring to the same experiments, needs no additional explanation.

TABLE I.

No. of experiment.	Methods employed.	Maximum inspiratory effect.	Autopsy.
5	Marshall Hall.....	0	<p><i>Left lung.</i>—All parts contain air; most expanded part, anterior portion of upper lobe; next to this, posterior part of base of lower lobe; least expanded part is the "lingula."</p> <p><i>Right lung</i> more uniformly distended; middle lobe most expanded.</p> <p>Every lobe floats in water. Of the right lung the most buoyant lobe is the middle, then the lower, then the upper; of the left lung the more buoyant lobe is the upper.</p> <p>Several small portions of both lungs do not float alone, among them the left apex.</p> <p>The most expanded portion of the whole lungs is the anterior part of the left upper lobe.</p>
	Silvester .....	2½ in.	
	Schroeder .....	5 cc.	
	Schultze .....	0	
	Schultze-Silvester .....	2½ in.	
	Schultze-Silvester .....	5 cc.	
	Schultze-Silvester .....	4 in.	<p>Mediastinal emphysema and double pneumothorax.</p> <p><i>Left lung</i> airless.</p> <p><i>Right lung.</i>—All the middle lobe and upper and inner edge of lower lobe fully inflated, the rest airless.</p> <p><i>Left lung</i> completely inflated, except a patch along anterior inferior edge, which was partially inflated.</p> <p><i>Right lung</i> completely inflated, but lower lobe less than the rest.</p>
8	Marshall Hall.....	0	
	Silvester (forcible) .....	6 in.	
	Schroeder .....	12 cc.	
	Schultze .....	0	
	Schultze .....	3 in.	
	Schultze .....	6 cc.	
9	Marshall Hall.....	½ in.	<p><i>Left lung</i> completely inflated, except a patch along anterior inferior edge, which was partially inflated.</p> <p><i>Right lung</i> completely inflated, but lower lobe less than the rest.</p>
	Silvester (forcible) .....	1½ cc.	
	Silvester (forcible) .....	6 in.	
	Schultze .....	12 cc.	
	Schultze .....	5½ in.	
	Schultze-Silvester .....	11 cc.	
	Schultze-Silvester .....	7 in.	<p><i>Left lung</i> floats as a whole, but upper lobe sinks; lower lobe floats, apex sinks; lingula floats with difficulty; lower lobe more buoyant than lingula.</p> <p><i>Right lung</i> floats as a whole; both lobes (there is no middle lobe) float at first, but upper lobe soon sinks; left lower</p>
	Schultze-Silvester .....	14 cc.	
	Howard .....	½ in.	
	Howard .....	0.25 cc.	
	Howard .....	0.25 cc.	
	Howard .....	0.25 cc.	
10	Marshall Hall.....	½ in.	<p><i>Left lung</i> floats as a whole, but upper lobe sinks; lower lobe floats, apex sinks; lingula floats with difficulty; lower lobe more buoyant than lingula.</p> <p><i>Right lung</i> floats as a whole; both lobes (there is no middle lobe) float at first, but upper lobe soon sinks; left lower</p>
	Silvester (forcible) .....	1 cc.	
	Silvester (forcible) .....	8 in.	
	Silvester (forcible) .....	16 cc.	
	Schultze .....	8 in.	
	Schultze .....	16 cc.	

No. of experiment.	Methods employed.	Maximum inspiratory effect.	Autopsy.
11	Marshall Hall..... Silvester (forcible) Schultze .....	$\frac{7}{8}$ in. 1.75 cc. 11 in. 22 cc. 7 in. 14 cc.	lobe is less buoyant than right lower lobe. No lobe of either lung is thoroughly inflated.  Mediastinal emphysema, right pneumothorax. <i>Left lung</i> floats as a whole; each lobe floats, the lower lobe the better; apex is airless; of lower lobe, lingula floats best, posterior part of base worst. <i>Right lung</i> floats as a whole; upper lobe sinks apex downwards, the other lobes float; apex airless; middle lobe floats best; posterior part of base is airless.
12	Marshall Hall..... Silvester (forcible) Schultze .....	$\frac{1}{2}$ in. 0.25 cc. 8 in. 16 cc. 7 in. 14 cc.	Mediastinal emphysema, left pneumothorax. <i>Left lung</i> sinks as a whole; upper lobe airless; lower lobe floats, but when divided the lingula floats, the rest sinks. <i>Right lung</i> floats as a whole, anterior surface uppermost; all the anterior surface fairly inflated, the rest airless; lower and middle lobes float; upper lobe sinks, and is nearly airless.
13	Marshall Hall..... Silvester (forcible) Schultze .....	0 $\frac{1}{2}$ in. 1 cc. 1 in. 2 cc.	<i>Left lung</i> quite airless. <i>Right lung</i> .—A few inflated lobules along lower front edge of upper lobe and extreme inner part of this border, and at corresponding point of middle lobe; lower lobe contains most air, then upper lobe; lower lobe partly inflated along anterior surface and along upper and lower edges.
E.	(Child laid on its face after death) <sup>1</sup> Silvester forcible)	...	Both lungs mostly inflated, right more than left. <i>Left lung</i> all inflated, except a vertical strip lying alongside vertebral column from apex to base, and a small patch of upper lobe just anterior to root. <i>Right lung</i> all inflated, except a patch of lower lobe just anterior to root.

<sup>1</sup> The object was to see whether posture had anything to do with the matter, allowing the blood to gravitate to the front instead of to the back of the lungs.

92 ARTIFICIAL RESPIRATION IN STILLBORN CHILDREN.

No of experiment.	Methods employed.	Maximum inspiratory effect.	Autopsy.
G. (14)	Silvester (forcible) { Marshall Hall..... { Schultze ..... {	6 in. 12 cc. $\frac{1}{2}$ in. 0.25 cc. 2 in. 4 cc.	Each lung floats as a whole, but the above-named airless parts sink when separated. Mediastinal emphysema, no pneumothorax. Both lungs expanded; least inflated part being two strips running vertically along the back, opposite the angles of the ribs.
J. (17)	Pacini ..... { Bain..... { Schultze ..... {	16 in. 32 cc. 16 in. 32 cc. 16 in. 32 cc. 4 in. 8 cc.	<i>Left lung</i> floats; both lobes separately float; all parts well expanded except lower and posterior edge of upper lobe and a line along the costal angles of the lower lobe, which is quite airless, and sinks. <i>Right lung</i> florid and expanded; one or two airless patches, the largest along the costal angles of the lower lobe.
K. (18)	Pacini-Bain ..... { Schüller ..... { Schultze ..... {	5 in. 10 cc. 0 $2\frac{1}{2}$ in. $4\frac{1}{2}$ cc.	Mediastinal emphysema, right pneumothorax. <i>Left lung</i> .—Anterior inferior part of upper lobe and lingula fairly expanded; front of lower lobe fairly expanded; lowest part of base posteriorly fairly expanded. <i>Right lung</i> airless.
L. (19)	Pacini-Bain ..... { Silvester (forcible) { Schücking ..... { Schultze ..... {	$5\frac{1}{2}$ in. 11 cc. $5\frac{1}{2}$ in. 11.5 cc. Do. 5 in. 10 cc.	Mediastinal emphysema, no pneumothorax. <i>Left lung</i> quite airless. <i>Right lung</i> airless, except middle lobe and anterior internal part of lower lobe. At anterior internal part of middle lobe is a patch of subpleural emphysema.

TABLE II.

No. of experiment.	Left lung.		Right lung.		
	Upper lobe.	Lower lobe.	Upper lobe.	Middle lobe.	Lower lobe.
5	Anterior surface best expanded of all parts of lungs; apex not floating	Posterior part of base well expanded; lingula least expanded	Least expanded	Most expanded	Fairly expanded.
8	Airless	Mediastinal emphysema and double pneumothorax.	Airless	Well expanded	Upper and inner edge well expanded; the rest airless.
9	Completely expanded	Completely expanded; except a patch on anterior inferior edge	Completely expanded	Completely expanded	Less well expanded.
10	Sinks in water	More buoyant than upper lobe (lingula hardly floats); less buoyant than right lower lobe	Less buoyant than lower lobe; soon sinks	Absent	More buoyant than right upper or left lower lobe.
11	Less buoyant than lower lobe; apex airless	Mediastinal emphysema; right pneumothorax.	Mediastinal emphysema; right pneumothorax.	Best expanded	Floats; posterior part of base airless.
12	Airless	Sinks as a whole.	Mediastinal emphysema; left pneumothorax.	Floats as a whole.	Floats; anterior surface inflated, the rest airless.
		Floats; but when divided lingula floats, the rest sinks	Nearly airless; part of anterior surface inflated, the rest airless	Floats; anterior surface inflated, the rest airless	



No. of experiment.	Left lung.		Right lung.		
	Upper lobe.	Lower lobe.	Upper lobe.	Middle lobe.	Lower lobe.
13	Quite airless		A few inflated lobules along lower anterior edge and inner part	A few inflated lobules at inner extremity of upper anterior border; the least expanded of the three lobes	Partly inflated along anterior surface and upper and lower edges; the best expanded of the three lobes.
E	Less expanded than right All expanded except vertical strip along angles of ribs, and a small patch anterior to root		Completely expanded	More expanded than left. Completely expanded	All expanded except a patch anterior to root.
G (14)	Well expanded, except a vertical strip along angles of ribs behind.		Mediastinal emphysema, no pneumothorax.		
J (17)	Well expanded, except lower and posterior edge		Well expanded	Well expanded	Well expanded except patch along costal angles.
K (18)	Anterior inferior part fairly expanded		Mediastinal emphysema; right pneumothorax.		
L (19)	Airless		Airless		
	Anterior inferior part fairly expanded		Mediastinal emphysema; no pneumothorax.		
	Airless		Airless		
			Partly expanded; at anterior internal part a patch of subpleural emphysema		

*Remarks.*

*Mediastinal emphysema* occurred in six cases; in four cases with pneumothorax

*Pneumothorax* of the four cases: one affected both pleural cavities, two the right, one the left.

In all cases the lung on the side of the pneumothorax was less expanded than the other.

The pneumothorax was probably partly the cause and partly the effect of the complete or incomplete collapse of the lung. Pneumothorax of course impedes the expansion of the lung. On the other hand, the rupture will probably occur into that side on which the lung expands the less, the pressure being greater on that side.

This subject will hereafter be treated more particularly.

In seven cases one lung could be said to be generally better expanded than the other.

In six cases the right was the better expanded, in one the left.

The apices were frequently the least expanded parts of the lungs, *e. g.* No. 5 both apices; No. 8 right; No. 10 both; No. 11 both; No. 12 left; L. (19) right.

The anterior surfaces were frequently better expanded than the posterior surfaces, *e. g.* No. 5 left upper lobe; No. 12 whole of right lung; No. 13 whole of right lung; K. (18) left lung; L. (19) middle and lower lobes.

In several of these cases the expanded patch was not bounded by lobes, but extended over the fissures to adjacent lobes, *e. g.* No. 12 whole of right lung; No. 13 right lung; K. (18) left lung; L. (19) middle and lower lobes.

In several cases an unexpanded strip lay vertically along the costal angles on each side of the vertebral column, *e. g.* E. left lung; G. (14) both lungs; J. (17) lower lobes both lungs.

In two cases these strips were not limited by lobes but crossed the fissures, *e. g.* E.; G. (14).

In one case, J. (17), the strip was seen on both lower lobes.

In some cases the lingula was better expanded than the rest of the left lung, *e. g.* 11; 12; K. (18).

In two cases it was airless or little expanded, *e. g.* 5; 10.

In no case was the posterior aspect of the lung generally better expanded than the anterior aspect, indeed, in one case (in which, with a view to testing whether the more frequent expansion of the anterior aspect of the lungs was due to supine decubitus after death, and consequent hypostatic gravitation of blood to the posterior aspect) the unexpanded vertical strip along the angles of the ribs was particularly well marked (Exp. E.).

On the whole it may be said that the parts of the lungs most frequently and thoroughly expanded were the anterior surfaces, not including the apices or anterior inferior edges.

The parts less frequently and thoroughly expanded were the apices, lower edges, and the vertical strips along the angles of the ribs posteriorly.

The more frequent and thorough expansion of the right lung may be due to the greater directness and size of the right bronchus.

These conclusions are very interesting, and can be accounted for.

First, the fact of the frequent non-expansion of the apices shows that the distance from the trachea does not explain the phenomena. Again, no doubt plugs of mucus will account for some of the unexpanded patches, but they will not explain the greater frequency of their occurrence in certain regions. Moreover the very distribution of many of these expanded and unexpanded patches disproves such cause, inasmuch as patches due to the patency or closure of a tube would be *limited to a lobule or lobe*.

Now we have seen that these patches are distributed

irrespective of fissures and lobes; therefore some other cause must be found.

This cause is, we think, to be found in the mobility of various parts of the chest walls.

The contents of the thorax are not under the conditions of fluid in a vessel, and the laws of equal pressure do not apply. If the chest walls are elevated in one part the external pressure opposite that spot is diminished, and the air will tend to expand the subjacent lung by preference.

On the other hand, the least mobile parts of the chest walls should overlay the least expanded parts of the lungs.

To apply these principles to the matter in hand. The most efficient methods of artificial respiration (*viz.* the Silvester group and the method of Schultze) act principally by elevating the ribs, clavicles, and sternum.

In a new-born child the upper ribs are hardly at all mobile, and the lower ribs are by far the most mobile. It is beneath the lower ribs, then, that the lungs should be most expanded, and this is the case; the action will be less at the diaphragm than a little remote from it, as the diaphragm acts little in Schultze's methods, and not at all in the Silvester group; and this is also the case. In one instructive case, L. (19) the situation selected for a solitary patch of subpleural emphysema was the anterior internal part of the middle lobe of the right lung.

Again the "indifference-point," or centre of motion for each rib is near its angle, and these very points form a vertical line along the spine which we have shown to very usually overlay two unexpanded vertical strips of lung.

How far these observations agree with the appearances in children which have breathed naturally we shall hereafter try to show; meanwhile, it may be remarked that these vertical strips occupy the very same situation as collapsed lung so often does in children, and that the lower edge of the anterior surface of the lungs, occupying as it does the sulcus between the ribs anteriorly and the diaphragm inferiorly, is dependent for its expansion on a consentaneous

action of the diaphragm and muscles moving the chest walls, and is often unexpanded. It has been elsewhere remarked that the mode of respiration by any of the efficient methods (Schultze's and the Silvester group), acting as it does by elevating the anterior thoracic walls, differs essentially from the natural mode of respiration in a new-born child, which is all but purely diaphragmatic.

The only considerable collections of the post-mortem appearances of the lungs of new-born children which I have been able to find are those of Joerg and Schmitt.

Out of Schmitt's 101 cases, 36 have been selected as bearing on the question and analysed; out of Joerg's 19 cases 16 have been selected and similarly treated.

The results are stated in the annexed tables, which have been compiled from positive statements only. The descriptions do not admit of more exact tabulation, being for the most part very brief.

The statements of Paris and Fonblanque, Bednar, Legendre, Gerhardt, Köstlin, Olshausen, Schwartz, and Böhr are either too inexact or are founded on too few cases to carry much weight.

*Analysis of Schmitt's cases.*

	Best expanded.	Least expanded.
Right lung . . . .	11	1
Left lung . . . .	3	4
Anterior surface . . . .	1	0
Posterior surface . . . .	0	2
Right upper lobe . . . .	9	3
Left upper lobe . . . .	7	4
Right middle lobe . . . .	9	3
Right base . . . .	2	12
Left base . . . .	3	9

Total cases = 36 out of 101, no cases in which inflation was practised being included.

*Analysis of Joerg's cases.*

	Best expanded.	Least expanded.
Right lung . . . . .	4	0
Left lung . . . . .	1	8
Anterior surface . . . . .	1	0
Posterior surface . . . . .	0	1
Right upper lobe . . . . .	1	3
Left upper lobe . . . . .	2	0
Right middle lobe . . . . .	1	3
Right base . . . . .	1	4
Left base . . . . .	1	4

16 cases selected out of 19.

*Analysis of cases of Schmitt and Joerg.*

	Best expanded.	Least expanded.
Right lung . . . . .	15	1
Left lung . . . . .	4	7
Anterior surfaces . . . . .	2	0
Posterior surfaces . . . . .	0	3
Right upper lobe . . . . .	10	6
Left upper lobe . . . . .	9	4
Right middle lobe . . . . .	10	6
Right base . . . . .	3	16
Left base . . . . .	4	13

52 cases selected out of 120.

The results are that in *children which have died soon after birth* :

1. The right lung is usually better expanded than the left.
2. The anterior surfaces are usually better expanded than the posterior.
3. The lower lobes are the parts most often unexpanded.
4. The right middle lobe is usually well expanded.
5. The part of the left lung corresponding to the right

middle lobe is often better expanded than the rest of the left lung ; when the right middle lobe, on the other hand, is ill expanded, the corresponding part of the left lung is often unexpanded also (Joerg, No. 1, Case 5 ; No. 2, Case 6).

It is remarkable that in children who have breathed naturally the bases are so often unexpanded ; but this seems to correspond with the fact that the characteristic of feeble breathing in infants is feeble descent of the abdominal viscera, betokening feeble descent of the diaphragm.

### *Conclusions.*

The following conclusions are offered :

*In stillborn children which have been manipulated by the various efficient methods of artificial respiration :*

1. The right lung is more usually and more completely expanded than the left.
2. The anterior surfaces are more usually and more completely expanded than the posterior.
3. The apices of the upper lobes are often unexpanded.
4. The anterior inferior borders the same.
5. One of the places of selection for atelectasis is a strip running vertically along the angles of the ribs on each side of the spine.
6. The patches of expansion or atelectasis, when considerable, are not confined to lobes nor bounded by fissures.
7. The last circumstance is not due to obstruction of the bronchi.
8. The spots of predilection for expansion or atelectasis underlie the regions of greatest and least movement of the chest walls.

*List of Works quoted.*

- Bednar.* (1) Die Krankheiten der Neugeborenen und Säuglinge. Wien, 1852. (2) Lehrbuch der Kinderkrankheiten. Wien, 1856.
- Böhr.* Henke's Zeitschr. f. d. Staatsarzneikunde. Erlangen, 1863, Band 85, S. 1.
- Gerhardt.* (1) Lehrbuch der Kinderkrankheiten. Tübingen, 1861. (2) Id., id., 1878, Band 3, Hälfte 2.
- Joerg (Ed.).* (1) De morbo pulmonum organico ex respiratione neonatorum imperfecta orto. Lipsiae, 1832. (2) Die Fötuslunge im gebornen Kinde. Grimma, 1835.
- Köstlin.* Arch. für Phys. Heilkunde. Stuttgart, 1854.
- Legendre.* Maladies de l'Enfance. Paris, 1846.
- Olshausen.* Deutsche Klinik., 1864, Band 16, Nos. 36, 37, 38.
- Paris and Fonblanque.* Med. Jurisprudence, 1823.
- Schmitt (Wilh. Jos.).* Neue Versuche und Erfahrungen über die Ploucquet'sche und hydrostatische Lungenprobe. Wien, 1806.
- Schwartz.* Die vorzeitigen Athembewegungen. Leipzig, 1858.





ON  
HYPERPYREXIA AFTER "LISTERIAN"  
OVARIOTOMY.

BY  
GEORGE GRANVILLE BANTOCK, M.D., F.R.C.S. Ed.,  
SURGEON TO THE SAMARITAN FREE HOSPITAL FOR WOMEN AND  
CHILDREN.

(COMMUNICATED BY JONATHAN HUTCHINSON, F.R.C.S.)

---

(Received September 25th—Read December 14th, 1880.)

---

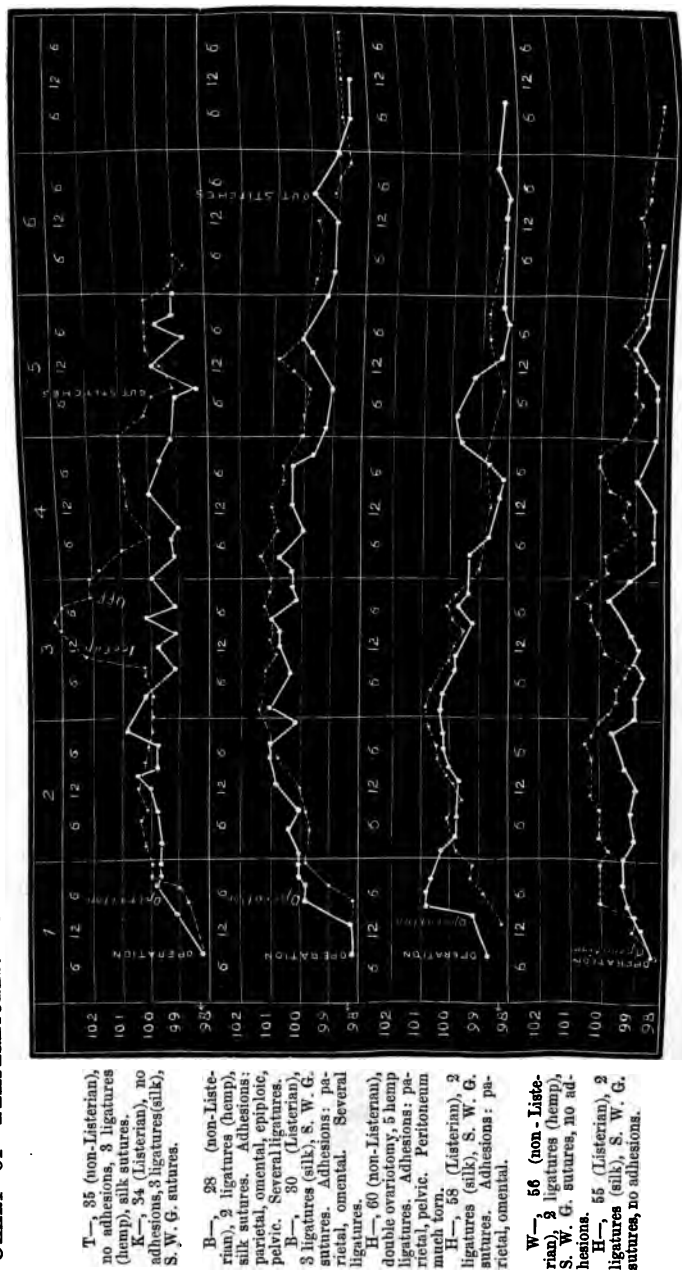
On the 10th of last February Mr. Lawson Tait raised a discussion before this Society on the general question as to the influence of "Listerism" on the practice of ovariotomy in his hands. He did not admit all the advantages attributed to it, and at the end of the discussion stood alone in the position he had taken up.

My object in the present paper is not to treat the general question, but to limit myself to an examination of the claim that has been set up, that the chief characteristic of Listerism is an absence of pyrexia. It is this claim that I venture to dispute.

The evidence that I have to bring forward on my adverse view of the subject comes first from my own experience, and secondly from reports published by other operators.

1st. So far as my own practice is concerned the fact is this: that as regards temperature the Listerian method, in a series of thirty-six cases, shows in its favour only a difference of four tenths of a degree, taking the average of the first four days, over another series of the same number done previously. Before the adoption of Listerism I had performed ovariectomy in thirty cases. I then operated six times according to Lister's method, but using thymol instead of carbolic acid. As this substance has been rejected as a germicide I may add these six to the preceding thirty cases, making up my first series to thirty-six. I then began Listerism pure and simple, with the exception that I did not use the "protective," preferring the dry dressing, which in one form or other has since become so general even among Listerian ovariectomists. Thus I continued up to my seventy-second case. What then happened, as I shall have to relate, forced me to reconsider the question. By this coincidence we have an opportunity of comparing the results of the two different systems of treatment in an equal number of cases. Of the first set of cases twenty-seven recovered. Of the second twenty-eight. The average temperature for the first four days was, in the former  $100.3^{\circ}$ , and in the latter  $99.9^{\circ}$ , a difference, as already stated, of only four tenths of a degree. But the most striking fact is that the lowest temperature is found in one of the non-Listerian cases, in which it did not exceed  $99.6^{\circ}$ . In every case of the second series the temperature reached the 100th degree. For the purpose of more exact comparison I have been able to bring together four sets of cases, of two each as nearly alike as possible on all points affecting the comparison. In the first pair, as is shown by the chart (see woodcut), the advantage is on the side of the non-Listerian by more than two degrees, while in the other three the advantage is only slightly on the same side. Of the non-Listerian cases the highest temperature was reached in one of the clamp cases and in a drainage case, in both of which it rose to  $103.6^{\circ}$ . But this compares favourably

CHART OF TEMPERATURES. *Those in broken lines are Listerian, those in continuous lines, non-Listerian.*



with the last four of the Listerian, in one of which it rose to  $107.2^{\circ}$ . The slight difference of only four tenths of a degree in the two series of cases may be accounted for by my want of experience in the earlier series; and by their more severe character. Thus, ten of the first series required drainage, only eight in the second. But this indicates more than meets the eye, for in the first series I was not so fully aware of the value of the drainage tube, and did not resort to it with the same frequency as in the second. Again, in the first series there were three clamp cases, in all of which there was high temperature, two requiring the ice-cap. The whole of the second series were treated with the ligature. Thus, in my Listerian practice it must be admitted that the claim for exemption from pyrexia cannot be sustained.

2nd. As for the evidence of others, no one has taken up Listerism more zealously than Volkmann, and the result is that he has not only encountered a state of post-Listerian pyrexia, but has admitted its occurrence by giving it the distinctive name of "aseptic fever." Then again Thiersch, while believing the theory of Listerism to be perfect, met with so much irritation from the use of the carbolic acid that he felt obliged to substitute salicylic acid. Keith, whose authority no one can question, in his paper on "Ovariectomy before and after Antiseptics," tells us that "carefully prepared tables of temperatures of the two sets of cases show very little difference. There was, as a rule, the same moderate rise of temperature up to eight or ten hours after operation—more marked, perhaps, in both sets of cases in young subjects, especially if in too good condition; then a fall by next morning, and again a rise in the evening to about thirty-four hours after operation." Then he goes on in these words:—"In three cases (Listerian) the temperatures were the highest I have ever seen a few hours after ovariectomy. In one it rose to  $104^{\circ}$ , but was down by next morning. In another, five hours after operation, it was  $106.2^{\circ}$ . In another,  $105.5^{\circ}$  eight hours after." The two latter "were long

operations, and there was long exposure of intestine and mesentery to the action of the spray. Now, I have rarely, not more than twice, seen a temperature of  $103^{\circ}$  in the evening of the operation in any case before antiseptics." "I have rarely met with high temperatures in ordinary operations." "I had never, before antiseptics, found it necessary to use ice to the head to bring down fever in the first days after operation. The ice-cap was only used once in a case of acute septicæmia, and the temperature remained unaffected. Indeed, in all my cases before the spray not more than five or six pounds of ice were got for the whole number, and the most of that was wasted."

All this evidence, derived from my own practice, and from the experience of others, is in direct opposition to the Listerian maxim that there can be no fever after antiseptic operation. In the discussion already referred to, Mr. MacCormac remarked that "after antiseptic operations there was only a slight (if any) rise of temperature, and then attributable to other causes." Mr. Wells stated that "his general impression of the result of antiseptics in subduing pyrexia was opposed to Mr. Tait's experience." And Mr. Thornton said that "as a rule there is no fever at all after antiseptic ovariotomy."

How is this conflict of evidence to be accounted for? Is it because the advocates of Listerism do not fully recognise the facts that present themselves? Or is it that they allow theoretical "general impressions" to modify their observations?

Having, as I believe, established my assertion that pyrexia in various degrees does follow Listerian ovariotomy, it is worth while to inquire how this is to be accounted for by those who have given their attention to the subject. Keith attributes hyperpyrexia to operating on women overfed, or in too full health, with small tumours, or to imperfect cleaning, or not draining of the abdomen. Yet he is "unable to account for the rapid rise of temperature in two" of the cases already quoted. Thornton, in a recent paper, "On the causes of Occasional

High Temperature after Antiseptic Ovariectomy," accounts for it by "reactive, nervous temperament, metrostaxis from irritation of ovarian nerves, and nerve-tension from too tight ligature of the pedicle," and gives as the most serious causes "congestion of the kidneys, deranged circulation from removal of a large tumour with little hæmorrhage, local peritonitis, sweat rash, and failure in perfect aseptic operation." While admitting the efficacy of some of these conditions in producing hyperpyrexia, I maintain that one of the most important and frequently acting has been overlooked. I refer to the action of carbolic acid, either as a local irritant, or as a poison.

I purpose to treat these two conditions separately, and first carbolic acid as a local irritant.

There can be no doubt as to its action in this way, and it will, I am sure, be thought sufficient if I quote Mr. Lister alone on this subject, not that there is a scarcity of evidence. This evidence is contained in the single word "protective," the name given to the material which he interposes between the wound and the carbolic acid. In a clinical lecture,<sup>1</sup> delivered at King's College Hospital on Nov. 24th last, he devoted some time to a repetition of his views on this subject, and he took pains to show that a most elegant preparation called *hyaloderma*, which has come over to us from Russia, lacked the one essential property of the "protective," inasmuch as it allowed the antiseptic to pass through and thus gain access to the wound. The effect of such access would be irritation of the wound and consequent elevation of temperature. Let me add to this the frequently observed action on the skin, under the gauze, resulting in a copious pustular rash.

Second, carbolic acid as a poison.

It has been long known that carbolic acid produces, in addition to its direct local caustic action, profound constitutional disturbance which may prove fatal without any evidence of local action. The first sign of this constitutional action that has been observed is the well known

<sup>1</sup> 'Lancet,' December 20th, 1879.

dark discoloration of the urine. In the earlier days of the use of carbolic acid as an external application, this effect was frequently noticed by surgeons, until the strength of the solution was reduced. It was not long before constitutional symptoms were observed, such as great depression, loss of appetite, &c., and these symptoms were not necessarily in proportion to the discoloration of the urine.

It appears that carbolic acid may be introduced into the circulation in a variety of ways. Thus, it may gain access by inhalation, by absorption through the skin and mucous membranes, through recent and through granulating wounds, and through the peritoneum and serous membranes.

So long ago as 1870 Dr. Lightfoot is found referring to a case of death from inhalation of carbolic acid for toothache.

In the 'Berliner Klinische Wochenschrift' for October 6th, 1879, a case is recorded by Dr. Hannhorst in which the application of a 15 per cent. solution of carbolic acid, by means of pads of cotton wool, to a commencing phlegmon on the arm (in the person of a nurse) caused the most grave symptoms in a few minutes. The patient lost consciousness, she threw herself about in bed, her face was flushed, pupils contracted, pulse slow, and breathing laboured. A 3 per cent. solution was substituted. In an hour the patient had recovered consciousness, and she was able to explain that, immediately after the application of the dressing she had felt a pain in her arm, and then lost consciousness. She now complained of fatigue and frontal headache. There was complete suppression of urine. Here then the absorption was through the unbroken skin. In connection with this I may mention another fact communicated to me by a distinguished surgeon, viz. that after a Listerian operation he invariably feels a pain, for some hours, up the arms. To this class also belongs a case incidentally noticed by Mr. Lister,<sup>1</sup> in which the application

<sup>1</sup> Ibid.



of spray and gauze, after amputation of the breast, repeatedly, *i.e.* with each renewal of the dressing, produced symptoms of carbolic acid poisoning, such as general debility, loss of appetite, and other symptoms.

As to its absorption through the mucous membrane, I need only allude to the numerous cases proving fatal when taken by the stomach, and to a case (also referred to by Dr. Lightfoot) which occurred at the Worcester Infirmary, in which death resulted in twenty minutes from the administration of a carbolic enema.

Carbolic acid may also be introduced into the system through a flesh wound. Professor Parkes, of Chicago, related to me the particulars of a case of amputation of both legs, in which the patient suffered from great prostration, hyperpyrexia, and suppression of urine. At a later stage the urine yielded hyaline casts, albumen, and indican in great quantity. Mr. Allingham informs me that the injection of a 5 per cent. solution of carbolic acid in the case of a patient on whom he had just performed excision of the rectum proved fatal in a few hours with the usual symptoms.

In my own practice of ovariectomy this proposition is also established by several cases. But I need only bring forward three to show that the carbolic acid, being so introduced, may fairly be assigned as the cause of the hyperpyrexia which characterised them.

On March 26th, 1879, I operated upon a woman, *æt.* 38, removing both ovaries. There were extensive adhesions to the omentum and to the right half of the pelvis, including the back of the uterus, which was much lacerated and required several ligatures. To provide for the escape of some blood which continued to ooze after I had secured all the bleeding points that could be brought into view, I put in a drainage-tube. The operation lasted about an hour and a half. Two hours afterwards, two ounces of urine were drawn off, but thence to the end of the case not more than two drachms were obtained. Five hours after operation the pulse was between 150 and 160, and very

small, temperature  $99.4^{\circ}$ . At the end of twelve hours the temperature was  $103.3^{\circ}$ , and in four hours more  $103.8^{\circ}$ .

The pulse was then 170 to 180 and very difficult to count, and the respirations were about 30. Stimulants were freely administered, but she gradually sank and died in twenty-seven hours. Post-mortem examination showed the kidneys enormously enlarged and deeply congested. There could be no doubt that the immediate cause of death here was the acute nephritis. But what was the cause of the nephritis? This was soon to be revealed, and was made clear fifteen days later by the case I now proceed to relate more in detail.

The salient points are these:—That the patient, *æt.* 55, had previous to operation been somewhat reduced by repeated tapplings, which yielded 417 pints of fluid within eighteen months; that there was a large extent of raw surface from the rupture of adhesions; that the temperature rose to  $107.2^{\circ}$  within thirteen hours of the operation; and that there was complete suppression of urine for twelve hours, followed by symptoms of acute nephritis. Recovery was due to the use of the wet pack.

Mrs. W—, *æt.* 55, was sent to me by Dr. Fowler, of Cirencester, and was admitted into the Samaritan Free Hospital in April, 1879, the subject of a large ovarian tumour of over two years' duration. Previous to admission she had been tapped nine times at decreasing intervals, yielding in all over 380 pints of fluid, and although the last tapping had been so recently as three weeks, she was already, in consequence of pressure, suffering from dyspnoea, vomiting after meals, and want of sleep. Under these circumstances I was obliged to tap her again, which I did on April 7th, drawing off  $37\frac{1}{2}$  pints of fluid. The left leg was much enlarged from an attack of phlebitis which occurred some months previously. The cyst began at once to refill. After two days' rest I removed the tumour on the morning of the 10th under strict "Listerism." Adhesions to the parietes and

omentum were very extensive; bleeding points were secured partly by compression forceps and partly by ligature; the pedicle was ligatured. The operation lasted about thirty-five minutes. At 2 p.m. (4 hours after), a small quantity of urine was drawn off; the patient was then rather depressed, pulse 112, resp. 30, temp.  $98.8^{\circ}$ . At 6 the tongue was rather dry at the tip and up the centre, skin not acting well, pulse 124, resp. 30, temp.  $100^{\circ}$ . At 8 o'clock  $2\frac{1}{2}$  ounces of urine were obtained, sp. gr. 1020, acid reaction, slightly muddy, no albumen. At 9 the tongue was more dry, skin also dry, face flushed, slight headache, manner depressed, temp.  $103.4^{\circ}$ , pulse 132, respirations varying between 30 and 44. She was then taking small quantities of brandy very frequently with barley water. At 11, the patient becoming restless and the temperature having reached  $103.4^{\circ}$ , pulse 132, and respirations 48, sighing, I had her chest sponged with iced water till cold. At 12.30 on the morning of the 11th, she could with difficulty be kept covered, and was somewhat delirious, though capable of being roused to answer questions slowly, pulse weak, 132, resp. 38 to 40, sighing, tongue dry in centre in spite of its being moistened every quarter of an hour with barley water and frequent small quantities of brandy. A beef-tea injection tried at this time returned immediately. At 1 o'clock, half an ounce of urine was drawn off; temp.  $104.4^{\circ}$ . She was again sponged over chest, arms, and legs, and expressed great relief. In half an hour, however, she was more restless than ever, and was scarcely conscious, failing to recognise me. She still swallowed everything that was put into her mouth, and she was supplied every few minutes with the teaspoon. Matters were now becoming desperate. I ordered the brandy to be discontinued, notwithstanding the weakness of the pulse, and I had the patient stripped of everything but the dressings, and laid upon a mattress covered with a large sheet of mackintosh, on which was spread out a wet bed sheet. The latter was now drawn over her from each side and liberally

supplied with cold water. Small pieces of ice were also placed upon her wherever they would lie, and a thin blanket was lightly thrown over her. Before ten minutes had elapsed she was quite quiet, and she appeared to be asleep, breathing more naturally. The temperature was now taken in the vagina, and was found to be  $107.2^{\circ}$ . From this time the patient improved in all respects and the temperature came slowly down, at the rate of about a degree an hour, so that at 8 it was only  $100^{\circ}$ . As she now began to feel chilly, she was put back to bed. At 9 she was quite quiet and comfortable, mind clear, tongue moist; she took her food (milk and barley water) well; pulse 104, only just strong enough to be counted at the wrist; respirations regular, 26. The catheter had been passed several times but no urine had been obtained. I now prescribed Tr. Digitalis *mj* every half hour. At 11, two drachms of urine were got; temperature in vagina  $99.4^{\circ}$ , pulse 98. In the afternoon the temperature again began to rise; at 2 it was  $102^{\circ}$ ; at 7.30 it was  $103^{\circ}$ ; at 10.30,  $103.6^{\circ}$ ; and at midnight  $103.2^{\circ}$ ; the pulse improved in quality, and rose to  $108^{\circ}$ ; the respirations ranged from 30 to 36. Up to 10.30 p.m., six ounces of urine had been obtained in three separate quantities of two ounces at intervals of four hours, clear, amber-coloured, and containing a small quantity of albumen.

12th.—After midnight the temperature went on rising till at 4.30 it reached  $105^{\circ}$ ; the patient was restless and delirious, and she was again packed. At 7 she was again put back to bed, the temperature having fallen to  $100.8^{\circ}$ , accompanied with a feeling of chilliness. At 9 temperature  $99.4^{\circ}$ , and at 11,  $99.2^{\circ}$ , falling towards night to  $98.8^{\circ}$ . The digitalis was continued all this time, and the patient was fed with the same diet. The urine increased in quantity (to four ounces at a time), and still contained a little albumen. On adding nitric acid after boiling it turned dark, as if ink had been added. From this time the temperature continued normal.

13th.—Urine about thirty ounces in twenty-four hours,

containing hyaline casts and some albumen. Digitalis every hour. At night every two hours.

15th.—Urine over 50 oz., no albumen. Digitalis discontinued. Tongue very clean and red. Abundant desquamation on neck and back.

On the eleventh day the stitches were removed. On the twelfth I prescribed Tr. Fer. Mur.  $\mathfrak{m}\mathfrak{v}$ , Tr. Digitalis  $\mathfrak{m}\mathfrak{v}$ , three times a day. On the fourteenth she got out of bed. A few days after this the right leg was again painful and more swollen, and lest this might be attributed to the pedicle, I may as well state that it was on the opposite side. The phlebitis subsided after a few days more, and with the aid of a bandage the swelling went down. The desquamation was the most abundant I had ever seen. The patient left the hospital on the forty-seventh day, and since her return home has been in very good health.

I shall not weary you with the details of other cases, in one of which the temperature rose to  $104\cdot4^{\circ}$  within twenty-four hours after the operation, with all the symptoms of acute nephritis, necessitating the use of the ice-cap.

More numerous, however, are the instances of poisoning through a granulating surface. Such cases are met with in great variety. Of these, perhaps the most interesting, as far as I know, is that reported by Dr. De Agostini in the 'Gazzetta degli Ospitali' for February 1st, 1880. A man,  $\text{aet. } 44$ , had a perinephritic abscess opened under spray, and the gauze dressing was moistened with a 2 per cent. solution of carbolic acid. After the operation the temperature rapidly fell, and in a few hours became normal. Next day the abscess cavity was twice washed out with a 1 per cent. solution until the fluid returned clear. This process was repeated daily. On the fourth day the fever returned, the temperature rising to  $101\cdot3^{\circ}$ , and for several days it went on gradually mounting higher and higher, until on the tenth it reached  $102\cdot5^{\circ}$ . At this time the wound looked quite healthy, and in the hope of arresting the fever the irrigations were ordered to be more frequently and diligently employed. The same

night the patient was seized with a violent attack of dyspnoea, with abundant serous expectoration, amounting to half a litre in the night, the pulse was small, there was great prostration of strength, for a time there was tracheal rattle, and the patient was considered to be in imminent danger. Next day this grave condition prevented the renewal of the dressings more than once, and a smaller quantity of the solution was used. At noon the temperature was  $103.2^{\circ}$ . On the following morning he was much better; temperature normal between eight and nine, but in the evening it rose to  $101.4^{\circ}$ . Two days afterwards, after examination of the chest, some limpid fluid was drawn from the left pleural cavity by means of Pravaz's exploring needle, with great relief to the symptoms. For a week the fever observed a remittent type, although the wound gradually progressed, the pus diminished in quantity, and the chest symptoms disappeared. The dressing was still changed once a day, but the amount of solution used was diminished, partly because the cavity was contracting and partly because the patient asserted that he felt worse after each dressing. The temperature then varied between  $99.5^{\circ}$  in the morning and  $103.1^{\circ}$  in the evening. Large doses of quinine frequently repeated had no effect. At last, suspecting the carbolic acid, Dr. De Agostini ordered salicylic acid to be substituted. In a few hours the temperature fell, and so rapidly that in thirty-six hours it was only  $97.5^{\circ}$ . In twelve days more the wound had healed, and the patient returned to his occupation. A long time afterwards Dr. De Agostini was informed that when the symptoms were at their worst, the urine was of a dark olive colour.

Numerous observers have called attention to the fact that the young are peculiarly susceptible of the action of carbolic acid applied externally. So impressed was Langenbeck with this peculiarity that, after witnessing two deaths after operations of no importance, he ceased to employ the spray in such subjects. Dr. Hunter, of Linlithgow, informs me that he has frequently observed

serious carbolic intoxication from the application of a carbolised lotion to inflamed and suppurating vaccine pustules. And Mr. Thomas Smith, in an article in the 'St. Bartholomew's Hospital Reports,' also refers to this susceptibility. It is probably due, in some measure, to the youth of my patient that I again encountered an instance of marked intoxication in the following case :

On April 3rd last I removed a large ovarian tumour, weighing over thirty-three pounds, from a young girl, æt. 16, who had been tapped a few weeks previously. The adhesions were numerous and extensive to parietes, omentum, and floor of pelvis, and the oozing of bloody serum was so abundant that I had to have recourse to the drainage tube. The strength of the solution and spray was only one in sixty. Nine hours after the operation the temperature had risen to  $102.8^{\circ}$  and the pulse to 142, and the ice-cap was applied. Suffice it to say under this head that the temperature rose to  $103.2^{\circ}$  within the next hour, and then fell gradually until at the end of twelve hours it was only  $99.2^{\circ}$  (pulse 88), and the ice-cap was taken off, and that with fluctuations of varying intensity, once reaching  $101.8^{\circ}$ , it did not attain the normal standard till six days after. *Twenty ounces* of bloody serum, in gradually diminishing quantities, were obtained from the tube in the course of the twenty-eight and half hours it was in use, and as evidence of the complete absence of septic fermentation I may state that the fluid removed on the last occasion, at once transferred to a bottle, still remains free from change : nor did the microscope show any bacteria. I mention this for the purpose of excluding the idea of septic mischief as the cause of the hyperpyrexia. Four hours after the operation twenty-five ounces of urine were drawn off, pale and slightly muddy, and containing a little albumen. On adding to it a solution of chloride of barium the only change was the slightest possible milkiness. Fearing that I had omitted something from the test, which I applied from memory, I obtained some urine from another patient not exposed to the action of carbolic

acid. The chloride yielded an abundant and dense precipitate. Four hours later seven ounces of urine were drawn off, and this gave even less precipitate, producing only the faintest possible opalescence. After four hours more six ounces of urine were got. This gave a decided precipitate and more albumen, and four hours later still the urine (six ounces) yielded a copious precipitate, though not so much as the normal urine. After this it was not tested with the chloride. On the fifth day the urine contained as much as one third of albumen. On this day the temperature ranged between  $99.6^{\circ}$  and  $101.2^{\circ}$ , and she was ordered ten-grain doses of cream of tartar (Pot. Tart. Acid.) three times a day. Diet consisted of milk and barley water. On the seventh day the albumen was still very abundant, and I prescribed Tr. Fer. Mur.  $\text{m}\text{i}\text{s}\text{s}$ , Tr. Digitalis  $\text{m}\text{i}\text{s}\text{s}$ , Extr. Ergot. Liq.  $\text{m}\text{v}$ , every four hours. On the following day the albumen was reduced to about one twentieth, and three days later it had quite disappeared. The patient went home on the twenty-sixth day.

It is scarcely necessary for me to demonstrate the fact that carbolic acid exerts a special action on the kidneys. All are familiar with the dark discolouration of the urine, but the chemical evidence is still more conclusive. The chemical investigation of this subject has shown that in a case of carbolic poisoning the normal sulphates are reduced in proportion to the degree of intoxication, and their place taken by sulpho-carbolates. Baumann gives a process for the quantitative analysis, but it is too complicated for any but a practical chemist. The test I relied on is that of Sonnenberg, and it is sufficient for all practical purposes. It showed that the normal sulphates had almost disappeared in the case just related. It was a fortunate circumstance that in this instance the kidneys were able to continue their function. In fact, this was distinctly exaggerated, and thus the carbolic acid was very soon eliminated. To this fortunate circumstance may justly be attributed the rapid improvement in the symptoms. But this is a condition which cannot be expected to occur very



often, for the most usual effect is in the direction of diminishing the urinary secretion, even to total suppression, as in the two first cases. Here I must call attention to the absence of the dark discolouration of the urine in this case. This has been observed by Sonnenberg, Lightfoot, and others, and we must, therefore, not conclude that, because there is no dark discolouration, the case is not one of carbolic intoxication, but that the symptoms are due to the some other condition. In the third case referred to there was decided colouring.

I shall not detain you by entering into the particulars of a case communicated to me in which the use of a carbolic lotion to an ulcer produced sanguineous diarrhoea, muco-sanguineous expectoration, dark urine, and great prostration, which immediately disappeared on discontinuing the application, and which returned with the reapplication of the carbolic lotion, again to disappear with its discontinuance. Nor need I produce any further evidence on the subject of carbolic poisoning beyond citing the words of Mr. Cluff in one of the 'University College Hospital Reports,' viz. that "more cases of persistent vomiting of an uncontrollable nature occur after operations, which vomiting may or may not be aided by chloroform, and the only cure for which is the leaving off of the carbolic application."

Keith in speaking of the cases of high temperature which I have already quoted, says: "I cannot account for the rapid rise of temperature in these two cases." I believe I am now in a position to furnish him with an explanation. The hyperpyrexia was due to carbolic poisoning.

I cannot refrain from quoting a note of warning uttered by the same author in these words: "That drawbacks may yet occur is quite possible. What I should be afraid of is the effect of very long-continued spray in severe cases in feeble women. A greater depression immediately following some of the very long operations has been observed."

I think I have now demonstrated that, in addition to

the evils which he so sagaciously anticipated, some of which have been realised, there is still another, even more formidable, viz. that of carbolic-acid poisoning.

There are other matters of great importance in connection with this subject, but this paper has already attained to such a length that I dare not even as much as allude to them.

It only remains for me to add that I have now proved that the claim that has been set up for Listerism cannot be sustained (in preventing pyrexia after operations); that carbolic acid may be introduced into the circulation in poisonous quantity by means of this method, that when so introduced it manifests its presence by producing a state of hyperpyrexia, and that thus it actually produces too often what it was intended to prevent. And the practical result of all this, so far as I am personally concerned, is that, to meet the evil which to me is so formidable, I have gradually diluted my spray and solutions so as to reduce the whole question to one of *cleanliness*, which, after all, is the true secret and merit of Listerism, and I am happy to say with the effect of very greatly adding to the success of my ovariectomy work.

TABLE of "Non-Listerian," "Listerian," and

By GEORGE GRANVILLE

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
1	St. Thomas's Hospital	34	M	4	7	1867	Parietal, omental, pelvic	R. Lig. (1)
2	Dr. Granville Bantock	41	M	5	...	Aug. 13 1870	Pelvic	{ R. Clamp L. Lig. (1)
3	Ditto	47	S	...	...	June 11 1873	None	R. Cautey
4	Dr. Dunlop, Alderton, Suffolk	28	M	1	...	Jan. 30 1875	...	R. Clamp
5	...	55	M	...	1	May 12 1875	Parietal, extensive, recent, omental	R. Clamp
6	Dr. Blake, Reigate	28	M	2	...	Nov. 13 1875	Parietal, omental, uterine and vesicular	R. Clamp
7	Dr. Woodward, King's Lynn	18	S	...	1	April 5 1876	Omental	L. Lig. (1)
8	Dr. Osborne, Islington	60	S	...	...	June 22	Parietal, pelvic (very firm and extensive)	{ R. Lig. (3) L. " (2)
9	Dr. Weber, German Hospital	25	M	...	...	July 21	Omental, pelvic and to opp. Fallop. tube	R. Lig.
10	Dr. Reed, Southsea	31	M	3	...	Aug. 2	Parietal, omental (very extensive)	{ L. Lig. (1) R. " (1)
11	St. Bartholomew's Hospital	48	M	4	3	Oct. 11	Parietal, omental, pelvic, uterine (very firm and extensive)	{ R. } Enuclea- L. } tion in one mass
12	Dr. Dunlop, Alderton	27	M	4	...	Nov. 8	Universal, parietal, omental, pelvic	R. Lig. (2)
13	Mr. Rundle, Southsea	28	M	4	...	Dec. 14	Parietal, omental, pelvic epiploic	R. Lig. (2)
14	Mr. Paulin Martin, Abingdon	28	S	...	...	1877	None	R. Lig. (2)
15	Dr. Baxter Forman, Stoke Newington	27	S	...	...	Jan. 10 1877	Universal; colon attached diagonally to parietes, &c.	R. Lig. (1)

*"Modified Listerian" completed Ovariectomies.*

BANTOCK, M.D., F.R.C.S. Ed.

Weight of tumour.	Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
33 lb.	min.	...	...	Recovery	...	Cardiac valvular disease, of which she died six months afterwards	1
12 lb.	...	...	...	"	...	Died of cancer of stomach, &c., one year afterwards	2
2 lb.	...	...	...	"	...	Parovarian cyst, ovary closely attached	3
9½ lb.	...	...	...	"	...	...	4
20 lb.	...	...	...	"	...	...	4
10½ lb.	...	...	...	* Death	Septicæmia	Inflammation following recent tapping of twenty-three pints	5
23½ lb.	...	...	...	* Recovery	...	Prolapse of pedicle; a baby April, 1879.	6
30 lb.	...	...	...	"	...	Malignant disease of peritoneum, and parovarian cyst (right) six months afterwards	7
16½ lb. 1½ oz.	...	...	...	"	...	Peritoneum severely injured in trying to find cyst-walls	8
16 lb.	35	Glass tube	...	"	...	Rupture of cyst with colloid contents a few hours before operation	9
4½ lb.	...	...	...	Death	Obstruction of intestine	Obstruction at commencement of sigmoid flexure; no peritonitis	10
150 gr.	...	...	...	Recovery	...	Several ligatures on uterus	11
10 lb.	75	Glass tube	...	Recovery	...	...	11
47 lb.	50	"	...	"	...	"A fine boy" Nov. 1st, 1877. The parietal adhesions extended from pubes to diaphragm, and from flank to flank	12
14½ lb.	...	...	...	"	...	Filamentous adhesions of uterus in Douglas's pouch; has had a child since	13
5½ lb.	...	...	...	"	...	...	14
11 lb.	...	Glass tube	...	"	...	Rupture of colloid tumour three weeks before operation; a forlorn hope; married 1878; baby 1880	15

## 122 HYPERPYREXIA AFTER " LISTERIAN " OVARIOTOMY.

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
16	Dr. Churchill, Aldershot Camp	15	S	...	...	1877. Jan. 31	Universal; intestines attached to one another and to tumour	R. Lig. (1)
17	Dr. Hullett Browne, Gordon Square	49	S	...	...	Feb. 28	Omental	R. Lig. (4)
18	Dr. Mead, Whitby	19	S	...	...	Mar. 17	None	L. Lig. (2)
19	Dr. Granville Bantock	25	S	...	...	" 28	None	L. Lig. (3)
20	Mr. Collins, Chew Magna	31	S	...	...	April 12	Extensive parietal	L. Lig. (5)
21	Mr. Kesteven, Holloway	37	M	4	...	May 2	Parietal, omental, intestinal and appendix cæci	R. Lig. (3)
22	Dr. Wynn Williams	37	M	1	...	June 27	Omental, pelvic	R. Lig. (4)
23	Dr. Mitchell, Somer's Town	43	M	12	1	July 18	Parietal, pubes to diaphragm, omental	R. Lig. (2)
24	Dr. Smith, Holloway Road	61	M	7	...	Oct. 10	Parietal, omental, epiploic	L. Lig. (3)
25	King's College Hospital	35	M	3	...	" 18	None	R. Lig. (3)
26	Mr. Lloyd, Shanklin, I. of W.	27	S	...	...	" 24	Parietal, omental, intestinal (many ligatures)	R. Lig. (1)
27	Dr. Fletcher, Camden Road.	41	S	...	1	Nov. 7	Parietal, omental	{ L. Lig. (2) R. " (2)
28	Dr. Granville Bantock	48	S	...	...	" 15	None	L. Lig. (2)
29	Dr. Robertson, Dulwich	56	M	9	1	Dec. 6	None. Ascites	R. Lig. (2)
30	London Hospital	36	M	7	1	" 28	Universal; parietal, omental intestinal, pelvic	R. Lig. (2)
31	Dr. Bradshaw, Nottingham	33	M	6	...	1878 Feb. 13	None	R. Lig. (2)
32	Mr. Parker Young, Delamere Crescent	49	M	3	...	" 20	Parietal, intestinal, very vascular (many ligatures)	R. Lig. (4)
33	Mr. Cockey, Frome	48	M	4	2	" 27	None. Ascites	L. Lig. (2)
34	Mr. Redmayne, Bolton	36	M	6	...	Mar. 2	Omental, uterine (many ligs.)	L. Lig. (2)

Weight of tumour.	Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
5½ lb.	min. 40	Glass tube	...	"	...	Inflamed dermoid, twisted pedicle; died of obstruction following year	16
6½ lb.	35	...	...	Death 9th day	Septicæmia	Patient in very delicate health, a small quantity of affused blood had slowly decomposed	17
7½ lb.	25	...	... *	Recovery	...	...	18
10½ lb.	25	...	...	Death	Septicæmia	Hæmorrhage from slipping of outer edge of pedicle	19
25½ lb.	75	...	...	Recovery	...	Died of peritoneal cancer three months afterwards	20
9½ lb.	35	...	... *	"	...	...	21
17 lb.	35	...	...	Death	Peritonitis	Wound burst open through coughing after removal of sutures	22
11 lb.	60	Glass tube, 41 hours	...	"	Abscess behind liver	Suppurating cyst; liver adhered to raw parietes, shutting in a small quantity of bloody serum; drainage of pelvis perfect	23
8½ lb.	...	...	...	"	Obstruction of colon	Kinking of colon under spleen; no peritonitis	24
13½ lb.	35	...	...	Recovery	...	Thick fleshy pedicle, four inches broad and barely half an inch long	25
7 lb.	45	Glass tube, 6 days	...	"	...	Dermoid; adhesions unusually firm and vascular	26
19 lb. 2 oz.	60	Glass tube 5 days	...	"	...	Infection of peritoneum; died of malignant disease 1879	27
29 lb.	25	...	... *	"	...	Experiment with silk and silk-worm gut sutures, former suppurating sixth day	28
13 lb.	30	...	...	"	...	Highest temperature 99°6'	29
21 lb.	60	Glass tube	...	Death 25 hours	Exhaustion	Heart weighed only four ounces; liver fatty; spleen pulpy	30
19½ lb.	40	...	Thymol, 1 in 1000	Recovery	...	...	31
15 lb.	60	Glass tube 4½ days	"	"	...	Inflamed cyst, pyrexia at time of operation; second operation same side 1881	32
17½ lb.	45	...	"	"	...	Infection of peritoneum; died five months after, malignant disease	33
23½ lb.	75	...	"	"	...	...	34

## 124 HYPERPYREXIA AFTER "LISTERIAN" OVARIOTOMY.

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
35	Mr. Cheatle, Burford	45	M	...	...	1878. Mar. 2	None	R. Lig. (9)
36	Dr. Brunton, Euston Road	40	S	...	...	" 13	Parietal	L. Lig. (5)
37	Dr. Wynn Williams	47	M	3	...	" 20	Pelvic	L. Lig. (4)
38	Mr. Fowke, Charwelton	51	S	...	1	" 27	Parietal, omental, epiploic (many ligatures)	L. Lig. (5)
39	Dr. Cole, Bath	23	S	...	...	" 28	Omental (six ligatures)	R. Lig. (4)
40	Mr. Thomson, Ramsgate	41	M	2	...	April 10	None	L. Lig. (7)
41	Dr. Jeafferson, Wandsworth	37	S	...	2	" 11	Parietal	R. Lig. (2)
42	Dr. Horne, Scarborough	27	S	...	...	" 24	Parietal	{ L. Lig. (4) R. " (2)
43	Dr. Purnell, Wells	35	M	3	...	May 1	Parietal, omental (about twenty ligatures)	R. Lig. (3)
44	Mr. Plewitt, Fenchurch Street	58	M	...	1	" 22	Parietal, omental	R. Lig. (7)
45	Dr. Jones, Clapham	24	M	T	3	" 29	Parietal, pelvic, uterine, vesical (many ligatures)	R. Lig. (5)
46	Dr. Shephard, Bristol	45	M	...	1	July 10	Parietal (very extensive), omental, epiploic (four ligatures)	R. Lig. (5)
47	Mr. Hewby, Notting Hill	39	M	2	...	" 17	None	{ L. Lig. (4) R. " (2)
48	Dr. Briggs, Jersey	23	S	...	...	" 19	Universal	L. Lig. (1)
49	Dr. Haughton, Mount Street	38	S	...	...	" 24	Parietal, omental (five ligatures)	R. Lig. (5)
50	Dr. Mackern, Long Eaton, Derbyshire	14	S	...	...	" 26	None	R. Lig. (5)
51	Dr. Swift Walker, Hanley, Staffs.	19	S	...	...	Oct. 17	Parietal, omental	R. Lig. (5)
52	Mr. Evans, Tir Phil, Cardiff	32	M	...	...	" 23	Omental (two ligatures)	L. Lig. (2)

Weight of tumour.	Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
3 lb.	60 min.	...	Thymol, 1 in 1000 *	Recovery	...	Tumour sessile; one of the ligatures discharged some months afterwards; quite well in 1881	35
9½ lb.	65	...	" *	Death	Septicæmia	Colloid tumour; fatty heart and liver; Cheynes-Stokes' respiration	36
15½ lb.	35	...	1 in 40 carbolic acid	Recovery	...	...	37
33½ lb.	75	...	"	Death	Acute congestion of lungs	Peritoneum and ligatured tissues quite healthy; chill from spray ?	38
13 lb.	60	...	"	Recovery	...	...	39
7½ lb.	90	...	" *	Death	Septicæmia 5 days	Dermoid, sessile; hæmatocele in broad ligament; hæmorrhage from needle hole	40
17 lb.	20	...	" *	Recovery	...	One third albumen in urine before operation; disappeared in three days	41
37 lb. 1 oz.	60	...	"	"	...	...	42
17½ lb.	90	...	" *	"	...	...	43
17½ lb.	50	...	"	"	...	...	44
16 lb.	105	Glass tube, 5 days	"	Death	Obstruction of ilium 7th day	Suppurating cyst; bladder ruptured	45
23½ lb.	75	...	" *	Recovery	...	Uterus torn; knuckle of intestine confined by blood clot or lymph	46
18½ lb. 6 oz.	30	...	"	Death	Acute bronchitis	Chill from spray ?; chronic pneumonic consolidation; peritoneum healthy	47
10 lb.	60	...	"	"	Shock	Died on table; moribund at time of operation	48
34½ lb.	35	...	"	Recovery	...	Suppurating cyst	49
4½ lb.	20	...	" *	"	...	Dermoid	50
16 lb.	40	...	"	"	...	...	51
28½ lb.	40	...	"	"	...	Consolidation of base of right lung; rupture of cyst; spontaneous evacuation through umbilical protrusion; died of malignant disease, 1879	52



No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
53	Mr. James Ceely, Aylesbury	36	S	...	...	1878 Oct. 30	None	R. Enucleation
54	Mr. Alban Doran	32	M	2	...	Nov. 2	Pelvic (three ligatures)	{ L. Lig. (5) R. " (3)
55	Dr. Pocock, Kensal New Town	32	M	T	...	" 20	Parietal, omental, intestinal, and iliac fossa (many ligatures)	R. Lig. (2)
56	Dr. Spooner, Blandford	19	S	...	...	" 29	Universal (almost enveloped in omentum), and appendix cæci (many ligatures)	R. Lig. (2)
57	Mr. Manser, Tunbridge Wells	26	S	...	...	Dec. 4	Intestinal; about a foot of ilium opposite Fallopian tube (six ligatures)	{ R. Lig. (2) L. " (5)
58	Mr. Sam. Berry, Birmingham	31	S	...	...	" 11	Parietal (extensive)	{ L. Lig. (5) R. " (5)
59	Dr. Wynn Williams	45	W	8	...	" 18	Parietal, omental (ligatures)	{ L. Lig. (5) R. " (3)
60	Mr. Nason, Stratford-on-Avon	27	S	...	...	1879 Jan. 2	None	L. Lig. (5)
61	Mr. Ruttle, High Wycombe	28	M	5	...	" 8	Omental, pelvic, opp. Fallopian tube, uterine (many ligatures uterine applied by needle)	{ L. Lig. (1) R. " (3)
62	St. Thomas's Hospital	41	M	4	3	" 30	Pelvic (three ligatures)	L. Lig. (3)
63	Dr. Robinson, Huddersfield	45	M	7	...	Feb. 12	None	L. Lig. (4)
64	Mr. Bradshaw Smith, Hinckley	45	M	7	1	" 19	Parietal, omental, epiploic (many ligatures)	L. Lig. (2)
65	Dr. Galabin	31	S	...	...	" 26	Parietal (very extensive)	L. Lig. (4)
66	Dr. Cremen, Cork	19	S	...	...	" 27	None	L. Lig. (4)
67	Dr. Rowland, Malvern Wells	57	M	5	1	Mar. 12	Parietal (very firm and extensive)	L. Lig. (3)
68	Dr. Granville Bantock	26	S	...	...	" 19	Omental (extensive)	R. Lig. (3)

Weight of tumor.	Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
14 lb.	min. 75	Glass tube, 2 days. India rubber, 9 days.	1 in 40	Recovery	...	...	53
15½ lb.	45	...	"	"	...	...	54
1 oz. 21½ lb.	105	Glass tube, 3½ days	"	"	...	...	55
17½ lb.	75	...	"	"	...	...	56
2 oz. 7½ lb.	55	...	"	Death	Rupture of intestine, 9th day	Suppurating cyst, gastro enteric catarrh; ulceration and rupture of intestine	57
30 lb. 13 oz.	80	Glass tube, 5½ days	"	Recovery	...	...	58
33 lb. 1 oz.	45	...	" *	"	...	...	59
17 lb.	50	...	"	"	...	...	60
10½ lb. normal	40	Glass tube, 7 days	"	"	...	...	61
14 lb.	75	...	"	"	...	Fourteen pints of ascitic fluid	62
19½ lb.	40	...	"	"	...	...	63
14 lb.	45	...	"	"	...	...	64
19 lb.	60	...	"	"	...	...	65
16 lb.	45	...	"	"	...	...	66
28½ lb.	50	...	"	"	...	Disease of thirty years' duration; eighteen years since tapping	67
12 lb.	40	Glass tube, 18 hrs.	"	Death 18 hours	Exhaustion	Soft sarcoma of ovary; infection of lumbar glands. High temperature before operation	68

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
						1879		
69	Mr. Alban Doran	39	M	6	...	Mar. 26	Omental, pelvic, uterine (many ligatures)	{ L. Lig. (5) R. " (3)
70	Dr. Colbeck, Dover	39	M	8	...	April 2	Parietal (recent)	{ L. Lig. (4) R. " (3)
71	Mr. Gilbertson, Aberystwith	55	W	4	...	" 7	None	R. Lig. (2)
72	Mr. Fowler, Cirencester	55	M	4	10	" 10	Parietal (extensive), omental	L. Lig. (4)
73	Mr. Ingoldby, Finsbury Square	49	M	3	...	" 16	None	R. Lig. (4)
74	Dr. Blake, Reigate	44	S	...	...	" 30	Omental	R. Lig. (4)
75	Dr. Bulmore, Falmouth	32	M	...	2	May 3	Omental, pelvic	R. Lig. (3)
76	Dr. W. H. Platt, Kilburn	59	W	7	...	" 14	None	R. Lig. (3)
77	Mr. P. Swales, Sheerness	39	M	9	...	" 21	Extensive omental	{ R. Lig. (3) L. " (4)
78	Dr. Wynn Williams	71	W	...	...	" 24	None	R. Lig. (3)
79	Mr. Moxon, Northampton	30	M	3	...	" 29	Omental (five ligatures)	R. Lig. (3)
80	Dr. Wynn Williams	53	M	14	...	" 29	Extensive parietal	R. Lig. (4)
81	Mr. Brooke, Langport	23	S	...	...	June 5	None	R. Lig. (4)
82	Mr. G. A. Brown, Tredegar	50	M	...	...	" 11	Broad attachment (many ligatures)	L. Lig. mai
83	Dr. Stewart, Nottingham	49	S	...	...	" 18	None	R. Lig. (4)
84	Dr. Browning, Rotherhithe	34	M	...	1	July 6	Extensive parietal, pelvic	{ L. Lig. (7) R. " (3)
85	Dr. Campbell, Calne	35	M	2	...	" 9	Parietal, omental (recent and very vascular)	R. Lig. (3)
86	Dr. Lake, Teignmouth	55	W	...	1	" 12	Parietal	{ R. Lig. (4) L. " (3)
87	Mr. Kershaw, Middleton	49	S	...	...	" 17	Omental, and opp. Fallop. tube	L. Lig. (6)
88	Dr. Clifford Allbutt, Leeds	22	S	...	...	" 23	Parietal, omental, pelvic	L. Lig. (3)
89	Mr. Jonathan Hutchinson	40	S	...	...	Sept. 24	Filamentous parietal	{ L. Lig. (4) R. " (3)
90	Dr. Tyacke, Chichester	22	S	...	...	Oct. 1	None	{ L. Lig. (4) R. " (3)

Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
min.						
80	Glass tube, 26 hrs.	1 in 40	Death 26 hours	Carbolic nephritis	Intense congestion of kidneys; suppression of urine; fatty heart	69
45	...	"	Recovery	...	...	70
25	...	"	"	...	...	71
35	...	" *	"	...	Carbolic nephritis; temperature 107.2°; cold pack	72
20	...	1 in 50	"	...	...	73
40	...	"	"	...	...	74
60	Glass tube, 3½ days	"	"	...	Enucleated from meso-colon and broad ligament	75
25	...	"	"	...	...	76
45	...	"	"	...	...	77
25	...	"	"	...	...	78
40	...	"	"	...	...	79
45	...	"	"	...	...	80
30	...	"	"	...	...	81
80	Glass tube, 10 days	"	"	...	Enucleated from broad ligament and meso-colon	82
45	...	"	"	...	Recovered from operation; died of otitis on twenty-first day	83
90	Glass tube, 3 days	"	Death	Exhaustion	Patient <i>in extremis</i> ; showed no sign of rallying from this condition; a "forlorn hope"	84
45	Glass tube, 44 hrs.	" *	Recovery	...	Inflamed cyst; internal rupture, with collapse, a fortnight before operation	85
45	Glass tube, 50 hrs.	"	"	...	Double colloid, both ruptured	86
50	...	"	"	...	Several fibroids in uterus; menorrhagia	87
85	Glass tube, 30 hrs.	"	"	...	...	88
45	...	"	"	...	Severe dyspepsia for three years; immediate relief	89
50	...	"	"	...	...	90

## 130 HYPERPYREXIA AFTER "LISTERIAN" OVARIOTOMY.

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
91	Dr. Wynn Williams	35	M	...	1	1879 Oct. 2	Parietal, omental, pelvic (very vascular)	L. Lig. (5)
92	Mr. Ashenden, Hastings	30	M	3	1	" 8	Parietal, omental (many ligatures)	L. Lig. (3)
93	Dr. Tuckwell, Oxford	22	S	...	...	" 9	Omental, pelvic	R. Lig. (2)
94	Dr. MacLachlan, Old Kent Road	57	W	8	...	" 15	None	{ L. Lig. (3) R. " (3)
95	Dr. Hope, Chobham	58	M	...	...	" 16	Parietal	L. Lig. (3)
96	Dr. Burnie, Nottingham	34	M	...	...	" 29	None	R. Lig. (3)
97	Dr. Granville Bantock	33	M	2	...	" 30	None	{ R. Lig. (7) L. " (3)
98	Mr. Hynes, Nottingham	30	M	...	...	Nov. 5	Parietal, omental (several lig.)	R. Lig. (3)
99	Mr. Alban Doran	53	M	...	...	" 11	Universal parietal, intestinal omental (nine lig.)	R. Lig. (3)
100	Mr. Phillips, Southend	23	S	...	...	" 12	None	R. Lig. (4)
101	Mr. Proctor, Birkenhead	37	M	2	...	" 18	Parietal, omental (three lig.)	L. Lig. (1)
102	Dr. Stewart, Nottingham	20	S	...	...	" 26	Parietal, pelvis (recent)	R. Lig. (4)
103	Mr. Tandy, Haverrill	24	S	1	...	" 28	Pelvic (one lig.)	R. Lig. (1)
104	Dr. Sheldon, Notting Hill	65	M	12	1	Dec. 3	None	R. Lig. (3)
105	Mr. Case, Fareham	23	S	...	...	" 17	None	{ R. Lig. (4) L. " (4)
106	Dr. Wallace, Clapham	66	M	6	...	1880 Jan. 13	None	R. Lig. (4)
107	Dr. Ridley, Hamilton, Canada	39	M	6	...	Feb. 5	Broad base, enucleation	L. Lig. (4)
108	Dr. G. A. Davies, Newport, Mon.	19	S	...	...	" 11	None	R. Lig. (4)
109	Dr. Lawrence, Upavon	23	S	...	1	" 17	None	R. Lig. (4)
110	Dr. W. R. Rogers	38	M	1	...	" 25	Omental, pelvic	L. Lig. (3)
111	Dr. Barrington, Bexley Heath	35	M	8	...	" 25	Omental	L. Lig. (3)

Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
min.						
90	Glass tube, 36 hrs.	1 in 50*	Recovery	...	Suppurating cyst; offensive	91
45	...	"	"	...	A girl, on August 29th, 1880	92
40	...	"	"	...	Dermoid; pregnant 6-7 months, July, 1880	93
50	Glass tube, 50 hrs.	"	"	...	Both ruptured; colloid	94
45	...	"	"	...	Dermoid; hair and teeth; uterine fibroid as large as goose's egg	95
35	...	" *	"	...	Small fibroid in back of uterus	96
100	...	"	"	...	...	97
45	...	"	"	...	...	98
90	Glass tube, 83 hrs.	"	Death 4th day	Acute nephritis	Obstruction of gall duct; fatty heart	99
25	...	"	Recovery	...	...	100
60	...	"	"	...	...	101
55	Glass tube, 112 hrs.	"	"	...	...	102
30	...	"	Death 11th day	Tetanus	Twisted pedicle; base of tumour adherent after twisting of pedicle. Nothing to explain tetanus except chill	103
30	...	"	Recovery	...	...	104
60	Glass tube	"	"	...	Ascites, amenorrhœa	105
25	...	"	"	...	...	106
70	...	"	"	...	Parovarian; rupture from fall two months previously; cyst flaccid, re-filling	107
20	...	"	"	...	...	108
25	...	"	"	...	...	109
60	...	"	"	...	Twisted pedicle; internal hæmorrhage, peritonitis, and inflammation of cyst	110
35	...	"	"	...	Suppurating; high temperature for days before operation	111

## 132 HYPERPYREXIA AFTER "LISTERIAN" OVARIOTOMY.

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tappings.	Date of operation.	Adhesions, &c.	Side, and treatment pedicle.
112	Dr. Smith, Grimsby	30	M	5	2	1880 Mar. 3	Parietal extensive, very tough, omental (five ligatures)	R. Lig. (3)
113	Dr. Guppy, Falmouth	60	M	10	...	" 10	None	L. Lig. (3)
114	Dr. Mason, Portsmouth Barracks	29	M	1	...	" 16	Extensive, firm, parietal	L. Lig. (3)
115	Mr. Alban Doran	25	S	...	...	" 18	None	L. Lig. (3)
116	Dr. Herbert Jones, Maryland Road, W.	38	M	...	...	" 24	Universal	Enucleatio
117	Mr. Manser, Tunbridge Wells	18	S	...	...	" 27	None	R. Lig. (3)
118	Mr. Sparke, Mansfield	16	S	...	1	April 3	Parietal, omental, pelvic (many ligatures)	R. Lig. (2)
119	Dr. Prance, Hampstead	31	S	...	...	" 7	None	{ R. Lig. (3) L. " (3)
120	Mr. Alcock, Burslem	40	M	...	...	" 15	Omental, pelvic (many ligatures)	R. Lig. (3)
121	London Hospital	46	M	5	1	" 21	Omental (ten ligatures)	L. Lig. (3)
122	Dr. Wynn Williams	62	M	1	...	" 30	Broad base, close attachment to intestine	L. No ped enucleat Four lig
123	London Hospital	50	M	8	...	May 3	Universal; parietal, omental, intestinal, &c. (twenty ligatures, about)	R. Lig. (2)
124	Mr. Hele, Aldeburgh	41	M	...	...	" 19	Complete enucleation	R. No ped
125	Dr. Griffith, Camberwell	24	S	...	...	" 24	None	L. Lig. (4)
126	Dr. P'Anson, New-castle-on-Tyne	25	S	...	1	June 1	None	{ L. Lig. (4) R. " (3)
127	Dr. Phibbs, Sutherland Gardens, W.	59	W	2	...	" 2	Mesenteric, pelvic (ten ligatures)	L. Lig. (5)
128	Mr. Clover	51	S	...	...	" 15	None	R. Lig. (3)
129	Dr. W. R. Rogers	48	S	...	...	" 16	Enucleation	L. Lig. (3)
130	Dr. Pope, West Malling, Kent	31	M	1	...	" 24	None	{ R. Lig. (3) L. " (3)

Weight of tumour.	Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
	min.						
20 lb.	60	Glass tube, 30 hours	1 in 50	Recovery	...	...	112
3½ lb.	35	...	"	"	...	Abdominal wound gave way in fit of coughing at end of week; intestines protruding; patient very fat	113
22 lb.	45	...	1 in 60	"	...	Inflammation of tumour	114
0½ lb.	35	...	"	"	...	...	115
5 lb.	75	...	"	Death	Shock, 20 minutes	Long continued suppuration; hectic or irritative fever	116
5 lb.	30	...	"	Recovery	...	...	117
4½ lb.	75	Glass tube, 24 hours	" *	"	...	Carbolic nephritis, acute; ice cap for twenty-five hours	118
1½ lb. oz.	35	...	"	"	...	Has since menstruated (after twelve months) regularly	119
4 lb.	60	Glass tube, 72 hours	"	"	...	Twenty ounces bloody serum from tube	120
4 lb.	45	...	" *	"	...	Acute carbolic nephritis; ice cap sixty-six hours	121
3½ lb.	50	Glass tube, 60 hours	"	"	...	Has since died of cerebral softening	122
10 lb.	35	Glass tube, 75 hours	"	"	...	Twisted pedicle, one turn, left to right	123
13 lb.	130	Glass tube, 65 hours	1 in 80	"	...	Slight carbolic poisoning, nephritis	124
14 lb.	35	...	"	"	...	...	125
1 lb.	40	...	"	"	...	...	126
20 gr.	110	Glass tube, 68 hours	"	Death 4th day	Acute uræmia	Cirrhosis of kidneys, acute suppression of urine	127
9½ lb.	40	...	"	Recovery	...	...	128
6 lb.	55	...	"	Death	Acute bronchitis and pleurisy	Query, caused by chill from spray; dermoid tumour, hair, &c.	129
0 lb. 30 gr.	30	...	"	Recovery	...	...	130



## 134 HYPERPYREXIA AFTER "LISTERIAN" OVARIOTOMY.

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous lappings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
131	Dr. George Taylor, Derby	27	M	3	1	1880 June 30	None	{ L. Lig. (4) R. " (3)
132	Dr. Galabin	23	S	...	...	July 1	None	{ L. Lig. (3) R. " (3)
133	Mr. Hosford, Kentish Town	28	M	...	...	" 15	None	{ R. Lig. (3) L. " (3)
134	Dr. Wynn Williams	25	M	2	...	" 21	Universal; parietal, omental, pelvic (about twenty ligs.)	R. Lig. (3)
135	Dr. Yarrow, City Road	26	M	1	1	" 22	Universal parietal	{ R. Lig. (3) L. " (3)
136	Dr. Thomas, Sheffield	51	W	2	...	" 28	Enucleation (many ligatures)	L. No pedicle
137	Mr. Marshall, Woodbridge, Suffolk	33	M	4	...	Oct. 6	None	L. Lig. (3)
138	Dr. Henry Savage	43	M	...	...	" 12	Pelvic	R. Lig. (3)
139	Dr. Webster Adams, Ipswich	34	M	3	...	" 12	Universal of right, none of left	{ L. Lig. (3) R. " (3)
140	Mr. Muir, Cornwall Road	55	S	...	...	" 13	None	L. Lig. (3)
141	Mr. Alban Doran	65	S	1	...	" 19	Enucleation (four ligatures)	R. No pedicle
142	Dr. Matheson, Granville Place	26	S	...	...	" 20	None	L. Lig. (3)
143	Dr. O'Hanlon, Spennywood	36	S	...	...	" 27	Omental (one ligature)	{ L. Lig. (3) R. " (3)
144	Dr. Gell, Kensal Green	25	M	4	...	" 29	Extensive omental (many ligatures)	L. Lig. (4)
145	Dr. Oswald, Kennington Road	32	M	5	1	Nov. 3	Universal; parietal, intestinal, pelvic	No pedicle
146	Dr. Wynn Williams	51	W	11	...	" 3	None	R. Lig. (3)
147	London Hospital	33	M	7	...	" 11	None	R. Lig. (3)
148	Dr. Bourne, Shoe-buryness	34	M	5	...	" 17	Parietal, omental (several ligs.)	{ R. Lig. (3) L. " (3)
149	Dr. Williams, Wrexham	43	M	13	...	" 17	Complete enucleation	L. Lig. (5)
150	Mr. Roots, Kingston-on-Thames	34	M	4	...	Dec. 7	Universal; parietal, omental, intestinal, pelvic	R. Lig. (2)
151	Mr. Webster, Merthyr Tydfil	29	M	5	1	1881 Jan. 4	Parietal, omental (many ligatures)	L. Lig. (3)
152	Dr. Mugliston, Enfield	55	M	4	...	" 11	None	R. Lig. (3)

HYPERPYREXIA AFTER "LISTERIAN" OVARIOTOMY. 135

Weight of tumour.	Duration of operation.	Drainage.	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
6 lb. 200 gr.	55	...	1 in 80	Recovery	...	...	131
17 lb. 300 gr.	35	...	1 in 100	"	...	...	132
9½ lb. 360 gr.	45	...	"	"	...	...	133
15½ lb.	110	Glass tube, 80 hours	" *	Death 4th day	Acute uræmia	Marked cirrhosis of kidneys; acute suppression of urine	134
42½ lb. 2 oz.	55	...	"	Recovery	...	Carbolic poisoning, slight	135
14½ lb.	45	Glass tube, 16 days	"	"	...	Carbolic poisoning; decrease of normal sulphates	136
21½ lb.	25	...	"	"	...	...	137
13 lb.	60	...	"	"	...	...	138
8 lb. 1 lb.	65	...	"	"	...	...	139
5½ lb.	25	...	"	"	...	...	140
15½ lb.	45	Glass tube, 8 days	"	"	...	Complete enucleation; many ligatures	141
35 lb.	25	...	"	"	...	Diabetes insipidus; nine and three-quarter pints in first twenty-four hours	142
11 lb. 2 oz.	30	...	"	"	...	Left, a dermoid; pedicle twisted one and a half, left to right	143
25 lb.	40	...	"	"	...	...	144
25 lb.	75	...	"	Death	Shock, 10 minutes	Suppurating cyst; hectic fever, great emaciation	145
4½ lb.	25	...	"	Recovery	...	Pedicle secured with silkworm gut	146
15 lb.	25	...	"	"	...	Silkworm gut on pedicle	147
12 lb. 73 gr.	55	Glass tube, 42 hours	"	"	...	Silkworm gut on pedicle and all bleeding vessels	148
14 lb.	40	Glass tube, 78 hours	"	"	...	Silkworm gut on pedicle, &c.	149
7 lb.	60	Glass tube, 48 hours	"	"	...	Twisted pedicle; hæmorrhage into cyst, inflammation, &c.	150
36 lb.	65	...	"	"	...	Induration for some weeks at site of ligatured parietal adhesions	151
28 lb.	50	...	1 in 150	"	...	...	152

## 136      HYPERPYREXIA AFTER "LISTERIAN" OVARIOTOMY.

No.	Previous medical attendant.	Age.	Condition.	Children.	Previous tapings.	Date of operation.	Adhesions, &c.	Side, and treatment of pedicle.
153	Mr. Alban Doran	59	M	7	...	1881 Jan. 12	None	R. Lig. (3)
154	London Hospital	58	M	7	...	Feb. 9	None	R. Lig. (3)
155	Mr. Cheatle, Burford	48	M	6	...	" 10	Parietal (very vascular)	R. Lig. (3)
156	Dr. Wynn Williams	58	M	...	...	" 16	Omental	R. Lig. (3)
157	Dr. Cocks, Buntingford	52	M	3	...	" 22	Parietal, omental, pelvic	R. Lig. (3)
158	Dr. Granville Bantock	40	S	...	1	Mar. 5	Parietal	R. Lig. (3)
159	Mr. Moxon, Brigg, Lincolnshire	34	M	6	...	" 9	Pelvic, very firm	L. Lig. (3)
160	Mr. Bubb, Wrangle	30	M	5	...	" 21	Parietal, pelvic, to ascending colon, gall bladder, and under surface of liver	R. Lig. (3)
161	London Hospital	41	M	10	1	" 30	Universal; parietal, omental, intestinal, pelvic (many ligatures)	R. Lig. (3)
162	Dr. Purnell, Wells	30	M	1	...	Apr. 23	Universal; parietal, omental, and to liver (many ligatures)	L. Lig. (3)

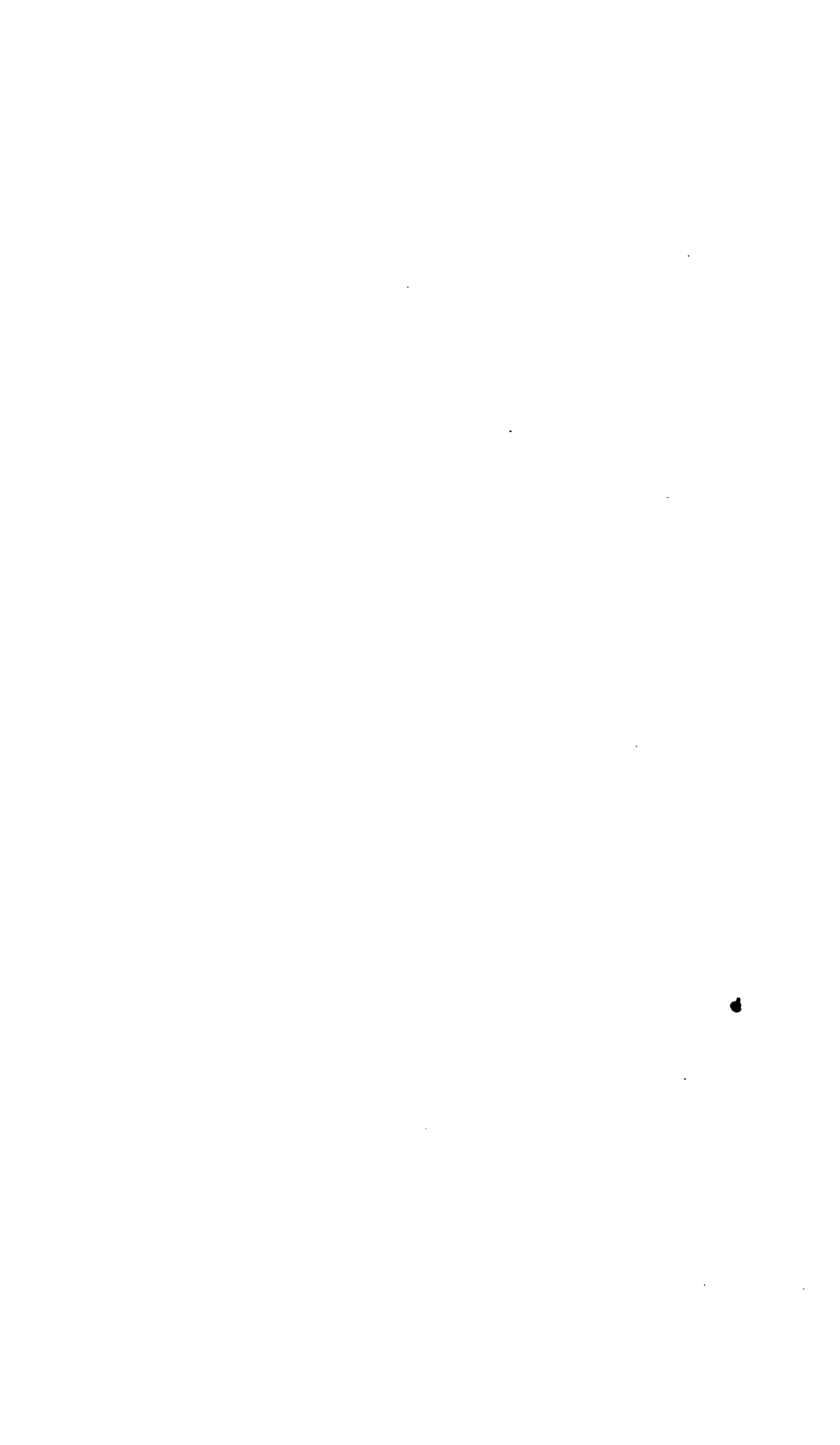
The cases up to 100 have already been published in a series of papers, but it has been deemed desirable to bring them together, as in this form they illustrate at a glance the various phases through which the operation has passed in my hands.

In the cases marked with an asterisk the ice-cap was employed for the reduction pyrexia (over 102°), and it will be seen that while of the 36 pure "Listerian" cases it was used in 7 as against 9 of the "Non-Listerian;" on the other hand, it was used in only 7 of the 90 "Modified Listerian." In the case marked † it actually raised the temperature nearly 2°.

Weight of tumour.	Duration of operation.	Drainage	Strength of antiseptic solution.	Result.	Cause of death.	Remarks.	No.
26 lb.	55 min.	...	1 in 50	Recovery	...	Spray only contained one in one hundred and fifty; phenol. instruments and sponges in plain water	153
30 lb.	55	Glass tube, 72 hours	Plain water	"	...	Twenty-eight pints of colloid, free in peritoneum	154
35 lb.	60	Glass tube, 77 hours	Plain water	"	...	Several pints of mucine colloid in peritoneum, from rupture	155
12 lb.	80	...	Plain water	"	... * †	Died a month after, of acute bronchitis	156
14 lb.	60	Glass tube, 114 hrs., 30 ozs.	Plain water	"	...	Second operation; burst cyst, probably malignant	157
3½ lb.	80	...	Plain water	"	...	Bladder wounded in incision	158
23 lb.	65	Glass tube, 28 hours	Plain water	"	...	...	159
60 lb.	70	Glass tube, 104 hrs.	Plain water	"	...	...	160
25 lb.	70	Glass tube, 17 hours	Plain water	"	...	Extreme emaciation; inflammation of cyst with pyrexia	161
29 lb.	80	Glass tube, 80 hours	Plain water	"	...	...	162

Soon after the reduction of the solution to 1 in 50 the spray was not used in the drainage cases after the operation. In those of the latter class done with plain water the product of the tubes, examined microscopically, was found to contain a few micrococci but *no Bacteria*. All these had very slight pyrexial temperatures.

Cases No. 151—162 inclusive have been recorded since the date of reading the paper to the Society.



ONE HUNDRED AND SEVENTY-TWO

ANTISEPTIC ABDOMINAL SECTIONS,

WITH

REMARKS ON THE CAUSES OF DEATH IN THE  
FATAL CASES.

BY

J. KNOWSLEY THORNTON, M.B., C.M.,  
SURGEON TO THE SAMARITAN FREE HOSPITAL.

---

(Received October 30th, 1880—Read January 11th, 1881.)

IN presenting to the Society a tabular record of so large a number of great operations, it is quite impossible to enter into details of most of the cases. It is indeed unnecessary, for in the vast majority the particulars in the tables are all that are needed. In them will be found the locality from which the patient comes, the place of operation, the date of operation, the social condition of the patient, the length of incision, the presence or absence of adhesions and their nature if present, the treatment of the pedicle or other points of origin of the tumour and its weight, and the final result of the operation. There are, however, certain other particulars of great importance in enabling us to judge how each case progressed to its final result; viz. the record of the highest temperature and pulse, with the day after opera-

tion on which they were noted. These I intend to give in future tables, even at the risk of making them somewhat bulky. I propose also, at the suggestion of my friend and colleague, Dr. Champneys, to give in future a table of all the cases of abdominal tumour which have come under my observation without being operated upon, during the period covered by the operation tables, with the reasons why no operation was performed. I had intended to add such a record to the present paper, but find my notes of the few cases I have rejected and my knowledge of their subsequent history too imperfect to render the table useful. I quite agree, however, with Dr. Champneys that, until such a table is published along with every list of ovariectomies and similar operations, it will be quite impossible, even with a faithful record of all incomplete operations, to judge either of the actual success of the individual surgeon in his treatment of ovarian or other similar disease, or of the general progress made in this branch of surgery. There are two facts in connection with the tables which I bring before the Society to-night, rendering them, I think, especially valuable as a contribution to our knowledge. The cases have all been treated on one common plan, viz. by Lister's method. When I say this I mean by *Lister's own method*, to the exclusion of all so-called *modified Listerism*. They have nearly all been also treated by "complete intra-peritoneal ligature."

There is, I am afraid, a growing tendency to ascribe to Lister's method bad results, which should more properly be ascribed to imperfect knowledge of Lister's teaching, and to consequent imperfect application of his method. As a result of this imperfect knowledge and performance, we have endless varieties of so-called modified Listerism, the modification generally striking so deeply at the foundations of true Listerism that it is an absurdity to attempt to connect such methods with his, even in name.

The fact that, by a rigid adherence to the teachings of my old master, I have in one of the operations (ovario-

tomy) steadily improved my results, lowering my rate of mortality from 23·94 per cent. to 4 per cent. is to me a sufficient reward for resisting this craze for variety.

The following tabular statement will render clear the progressive improvement:

Ovariectomy, non-antiseptic cases, mortality 23·94 per cent.

Ovariectomy, intra-peritoneal non-antiseptic cases, mortality 19·35 per cent.

Ovariectomy, antiseptic cases (all intra-peritoneal), mortality 10·00 per cent.

Ovariectomy, first seventy-five of these antiseptic cases, mortality 16·00 per cent.

Ovariectomy, second seventy-five of these antiseptic cases, mortality 4·00 per cent.

The change from the non-antiseptic to the antiseptic method has on the total result reduced my rate of mortality by 13·94 per cent, or comparing the two series of intra-peritoneal cases, by 9·35 per cent. The difference between the first half of my antiseptic cases, while I was learning how best to apply Lister's method, and the second half, when I had practically discarded drainage, is still more strikingly seen in a reduction of 12·0 per cent. A glance at the tables of miscellaneous abdominal sections, with the date of their performance, will show that, making due allowance for the greater gravity of the operations, and the more unfavourable conditions under which they were performed, an equally steady improvement in results has been obtained. The number of these operations is in each class too small at present to make comparative percentage calculations of service.

Dr. Keith, in a recent letter to the 'British Medical Journal,' July 31st, speaks of ninety-eight cautery cases with only two deaths. Comparing this result with my seventy-five cases with three deaths, it would appear that my application of Listerism is not yet quite perfect. I am not, however, at all sure that in a long run of some hun-



dreds of cases it will be found possible to bring the mortality down below 4 per cent, *i.e.* if the plan I have adopted be strictly followed, and every case which has the least chance of recovery is given that chance; in other words, if there is no selection of cases, with a view to perfect statistics. Had I refused operation to a poor woman dying of septicæmia with a universally adherent cyst (No. 95), and to another apparently dying of malignant disease (No. 104); or had I stopped either of these operations, and tabulated them as incomplete, I should have had only one death in my second seventy-five cases.

Before proceeding to examine more particularly into the actual causes of death in the fatal cases, it will be of interest to note the following facts as to the different groups of cases.

*Complete ovariectomies* 150.

50 of these had no adhesions and all recovered.

30 „ „ „ slight adhesions and all recovered.

70 „ „ „ extensive adhesions, and in them the whole mortality occurred.

15 cases were operated upon in private houses, and all recovered.

6 cases were operated upon in nursing houses, and all recovered.

50<sup>1</sup> cases had been tapped and 7, or 14 per cent., died.

100 cases had never been tapped, and 8, or 8 per cent., died.

117 cases had only one ovary removed, and 10, or 8·54 per cent., died.

33 cases had both ovaries removed, and 5, or 15·15 per cent., died.

In the whole 150 cases I only drained twelve times, and 3, or 25 per cent., of the drainage cases died; six of these cases were *completely* drained, *i.e.* the glass tube or an india-rubber substitute was kept in as long as anything drained away, and of these two died. The other six were

<sup>1</sup> In 7 of these 50 cases the cyst contents were putrid as the result of the tapping, and 5 of the 7 died after ovariectomy.

only very *partially* drained, *i.e.* the tube was withdrawn under the spray very soon after the operation, because it appeared to me to be causing peritoneal irritation or keeping up hæmorrhage; one of these died.

These results of drainage did not appear to me at all satisfactory, and I determined to abandon the practice, keeping a careful note of those cases in which the tube would have been used. The result is that since I gave it up I have had seventeen cases in which it was indicated, and only two of them, or 11·76 per cent., have died, and one of the two died of malignant disease. The 25 per cent. mortality in the drainage cases certainly does not favour the supposition that I should have gained by continuing the practice, and when I turn to the published results of those ovariologists who have most strongly supported drainage, I get either indefinite information, or definite information which encourages drainage less than my own results do. Dr. Keith, who has been the great apostle of drainage, has given no definite comparative statistics of his drainage cases; and in his paper on "The results of Ovariectomy before and after Antiseptics," 'Brit. Med. Journal,' Oct. 19th, 1878, he frankly admits that drainage has serious drawbacks. My colleague, Dr. Bantock, another great advocate of drainage, has published<sup>1</sup> seventy-five ovariectomies with eighteen cases in which he drained, and of the eighteen, five, or 27·77 per cent., died, a mortality nearly 3 per cent. greater than that of my drainage cases, and therefore I cannot suppose that it was my want of skill in using the method which led to the mortality which deterred me from continuing to use it. Dr. Keith, in his letter to which I have already referred, says: "Where would the antiseptic system be without drainage?" He is speaking of the special operation of ovariectomy, and I reply, from my experience of that operation since I discarded drainage, with a mortality of only 4 per cent.!

It is clear to anyone who carefully considers the subject, that if Lister's theory and practice are sound, drainage

<sup>1</sup> 'Brit. Med. Journal,' May 24th, 1879, and June 12th, 1880.

ought not to be necessary in peritoneal surgery, provided that his method be faithfully applied. It is quite a different matter when we have to deal with other surgical wounds, in which pent-up fluids may lead mechanically to tension, inflammation, and suppuration, even while they remain aseptic.<sup>1</sup> Of course, there is the danger to which I have elsewhere referred, that the fluids left in the peritoneum or effused in the early hours after its closure, may cause peritonitis; but I think my results render it clear that the possible danger from this cannot be compared with the actual and admitted dangers of the drainage tube. In every case the individual surgeon must be guided by his own conviction, as to whether the operation has been so thoroughly antiseptic that he can close the peritoneum with confidence that all inside is aseptic. That this result can be attained is amply proved; and it is equally certain that we can, if we will, avoid both for our patients and ourselves the risks and troubles of drainage. If we now examine the causes of death in the fifteen fatal ovariectomies we find that:

Three died of shock and one of hæmorrhage within a very short time after operation. Possibly it would have been wiser not to operate in either of the four cases, for I am quite certain that under no circumstances could they have survived; but this is being wise after the event, and I should still feel bound in like cases to operate if the patient desired it. The case of hæmorrhage was a very curious one, the hæmorrhage taking place from the coats of a dilated Fallopian tube, which I had opened and cleaned out. The amount of blood lost would not have killed an ordinary patient, but she was dying when I operated from putrefaction in a large and extensively adherent multilocular tumour.

Two died of acute pleurisy, and in both cases I think we cannot acquit the method of operation of blame, the weather was in each case bitterly cold, and I believe the chilling of the spray was the active agent in the mischief.

<sup>1</sup> 'Lancet,' August 30th, 1879.

In the second case I drained, and I believe that the chilling and exposure at the frequent dressings rendered necessary by the presence of the tube, were the actual cause of the chest complication. I am afraid that with all possible precautions there must be some risk of chill when a difficult operation is performed in very cold weather; but I quite admit that at the time these deaths took place my precautions against such a danger were not so perfect as they might have been and now are.

Three patients died of undoubted septicæmia, and these three, with the hæmorrhage case, and one of those which died of shock, make up the five cases already referred to as really killed by non-antiseptic tapping.

One case died suddenly on the fourth day, and as the head could not be examined and there was nothing in the abdomen to account for the result, the real cause of death must remain an open question. It was one of the cases in which much tearing of broad ligament tissues was necessary, and the temperature rose rather rapidly on the first night to 101°. The nurse put on the ice-water cap without my orders, though there was profuse perspiration and free metrostaxis; both were suddenly checked, and the temperature rose instead of falling with the cap, and I cannot help thinking that this started the mischief.

One patient died of cardiac and renal disease, and I am sure I ought not to have operated; but I trusted to the immunity from sepsis to carry me through. The case was published<sup>1</sup> in full at the time by Mr. Doran and myself.

One patient died of obstructed intestine, a complication much more common in the days of septic peritonitis than it is now, but one to which we must, I fear, always be exposed in whatever way the adhesions and pedicle are treated. It is always a subject of surprise to me that we do not more often meet with it.

One patient died in twelve hours with complete suppression of urine. I operated during a very acute peritonitis, a proceeding which I should not advise in future.

<sup>1</sup> 'Obstetrical Journal,' vol. vi, p. 281.

It was a long and difficult operation, and it is quite open to question how much the carbolic acid had to answer for in the result, though we must not forget that these cases of suppression of urine after difficult operations were occasionally met with before we used any carbolic acid at all.

The next death was one already referred to, and was due to general malignant disease of the peritoneum, omentum, &c. I might very well have placed the case among the incomplete ovariectomies, but I hold that no case ought to be called incomplete in which the pedicle is dealt with and the main mass of the tumour removed. If some rule of this kind be not adhered to, cases in which small portions of the cyst are necessarily left adherent to intestine, &c., will become complete or incomplete as the patient recovers or dies.

The last fatal case in the table will be found without any cause of death, because I am not certain myself of what she died. It was a very difficult operation, with two large tumours and much tearing open of the broad ligament, and she did not do well from the first, obstruction of intestine threatening at one time. When she was much reduced, she was attacked with ulceration of the left tonsil, to which she had been very subject; it assumed a low type from the first, and she died, as will be seen, on the fourteenth day, the immediate cause of death being a fetid parotid abscess on the same side as the ulcerated tonsil. The death is clearly due to ovariectomy, but whether to suspect any failure in my antiseptic arrangements, or to blame the throat affection coming upon her when she was already prostrated by a very serious operation, I cannot decide. Parotid swelling seems in my experience especially liable to occur after an ovariectomy in which there has been much enucleation from broad ligament and uterine tissue; and in the other cases which I have seen it has certainly been of septic origin. Whether it is also known as a result of ulceration of tonsil I cannot say.

The discussion of this case affords a good opportunity for the introduction of a subject to which I shall have again to refer in speaking of the uterine cases. In many cases of ovarian disease the tube is elongated and dilated, and this condition is especially likely to be present in cysts whose lower segments are seated in the layers of the broad ligament. In the enucleation, which this last condition renders necessary, this dilated tube may very easily be torn open without the operator being aware of it; and should this accident happen, an open channel may be left into the uterine cavity which contains septic material. The tube itself when diseased and dilated is not unlikely to contain septic mucus, and the tearing open or the passage through it of one of the transfixing silk ligatures may thus leave a road for the entrance of putrefaction into the deepest recesses of the peritoneum. The fact that this is a possible accident and one that we cannot altogether guard against constitutes, I think, the one weak point in the antiseptic performance of ovariectomy. Fortunately the cases in which there is this condition of tube are comparatively rare.

With the above details of the fatal cases before us, it is easy to group them, so that we see at once the bearing of the antiseptic methods on the results.

GROUP 1.—Fatal cases which were not influenced by the method, or in which the result was due to the patient's condition before operation :

3 Shock.

1 Hæmorrhage.

4 Septicæmia.

1 Cardiac and renal disease.

1 Obstruction of intestine (patient hemiplegic and in an extremely depressed mental condition).

GROUP 2.—Fatal cases which the method should have saved! Were the details of its application perfect?

1 Obscure brain affection.

1 Septicæmia (the patient with ulceration of tonsil).

GROUP 3. Fatal cases in which the special method, or

my want of skill in applying it, may have actually brought about the fatal result :

2 Acute pleurisy.

1 Suppression of urine.

Passing now to the consideration of the five *Incomplete ovariectomies*, it will be seen that the two in which I used a glass drainage tube were both fatal. Now, it seems to me that there are two very simple explanations of this result. In these incomplete cases, the tearing and separation is often extensive, and portions of cyst are left behind, which continue to secrete fluid; if all is thoroughly aseptic and the peritoneum is closed, much of the effused serum is rapidly reabsorbed by the peritoneum, and aids in keeping up the patient's strength. Whereas if a drainage tube is introduced, all this blood and serum drains away, and more or less exhaustion results. Then, again, the overflow in these cases is so great that it is almost impossible to keep things aseptic, and septicæmia steps in to complete the work begun by the exhausting drain.

Of course, if we have to deal with a cyst whose contents are already putrid, the position is altered, and the tube may be used; but, looking to the results occasionally obtained before either drainage or antiseptics were used, I am inclined even in such cases to endeavour to destroy the existing sepsis and to close the incision. The two deaths in the next table, *Exploratory operations with simple removal of fluid*, are examples of this class of cases; both patients had cysts with putrid contents, and were almost moribund before I operated, and drainage could not by any possibility have altered the result.

We now have to consider the important class of *Operations for the removal of uterine tumours*. These operations are yet in their infancy, and we have everything to learn, but I think those recorded in my table teach some useful lessons.

There are three cases of operation for the removal of fibro-cystic tumours of the uterus, and in one of them the left ovary was also removed; all recovered.

There are five cases in which uterine outgrowths were removed with or without one ovary; four out of the five recovered. Thus, we have seven recoveries in eight operations, but mark the fact that in none of them was the uterine cavity opened, and hence it was possible to complete really aseptic operations. In the fatal cases (three of the antiseptic series), the pregnancy and other complications fully detailed in the 'Transactions of the Obstetrical Society,' vol. xxi, amply explain the fatal result, which was immediately due to obstruction of intestine.

In one other case (8 of the antiseptic series) an outgrowth was removed, but the cavity of the uterus was opened, and the opened portion was included in the blades of a Wells' ovariectomy clamp; this portion sloughed, and the patient died of septicæmia.

In three cases hysterectomy was performed; and in two of them both ovaries were removed along with the supra-vaginal portion of the uterus. One case died of shock almost immediately; another, in which I trusted to the cautery, died in eight hours of hæmorrhage; and the third recovered without a single bad symptom, and is perfectly strong and well now. This last case, together with a similar one successfully operated upon before I adopted Lister's method, show that there is not *necessarily* any great shock in this formidable operation.

What we have to fear in these cases, and in those in which the cavity of the uterus is opened in removing fibro-cysts or solid outgrowths, is *sepsis*. What we have to find out is how to render these operations really *aseptic*, or how to deal with the divided uterine wall in such a way as to render the septic material least dangerous. Suture of the peritoneal edges of the uterine wound, so as at once to close the peritoneal cavity, the raw surfaces being left without suture towards the interior of the uterine cavity, in order that discharges may escape by the cervical canal, seems to answer in some cases; but this method has one great disadvantage.



The ligatured mouths of the vessels and portions of half strangled uterine tissue are extruded from our aseptic area, and we know from operations in the interior of the uterus for the removal of polypi, &c., that stumps in the cavity, however treated, are very apt to lead to septicæmia.

I prefer the Wells' clamp to anything else that I have used or seen used for complete hysterectomy; but unfortunately it leaves us also exposed to the risk of septicæmia, and can only be applied in a small number of cases in which the supra-vaginal portion of the cervix is not much enlarged. It has also the disadvantage of much prolonging convalescence and leaving a nasty sore, and eventually a weak place in the cicatrix.

I am firmly convinced, from what I have seen of this branch of uterine surgery since the introduction of antiseptics, that we only want a surely aseptic method to render complete and partial removal of the uterus as little fatal as ovariectomy.

The remaining cases in the table call for no special comment, one being merely exploratory, one a removal of a small piece of adherent omentum which was causing pain, and the other two having been already separately published.

The great lessons I have learnt while performing these one hundred and seventy-two operations may be briefly stated in conclusion:

1. In the simple cases the patients recover under Lister's method with a certainty previously unknown.
2. There is less fever, and convalescence is more rapid than under the old method.
3. The success obtained in the more complicated cases is in proportion to the exactness with which the antiseptic method can be applied to the individual cases.
4. The accidents and complications occasionally following operations, such as hæmorrhage, for example, are more easily overcome in cases which are strictly aseptic.
5. There are difficulties, and even dangers, in the appli-

cation of the method, and the more experience the individual surgeon has in it, the more readily he foresees and avoids these, and the more complete becomes his success in applying it.

I would say, in conclusion, that great as I believe the debt to be which peritoneal surgery owes and will owe to Mr. Lister, I am far from forgetting that it owes a still larger debt to Mr. Spencer Wells; without his untiring energy and success, we should to-day have been as backward in all peritoneal surgery as, I fear, we still are in one special branch of it, viz. the treatment of uterine tumours. To Mr. Wells the glory of ovariectomy must ever be, but to some fortunate follower may still belong the credit of placing hysterectomy and its modifications in an equal position, and whoever he may be his labours have already been lightened for him by the application of Lister's method to abdominal surgery.

TABLE OF COMPLETE OVARIOTOMIES. BY J. KNOWSLEY THORNTON, M.B., C.M.

*Operations performed antiseptically.*

No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Adhesions.	Length of incision.	Treatment of pedicle.	Weight of tumour.	Result.	No. in anti-septic series.
39	From another hospital	Samar. Hosp.	M.	33 Oct.	1877	None	Inches.	Ligatures	Pounds.	Recovered	1
40	Dr. Pickett, Notting Hill	Ditto	M.	37 Oct.		Parietal and omental	4	Ligatures	21	Recovered	2
41	Dr. Nield, Plymouth...	Ditto D	S.	16 Oct.		Parietal, omental, and intestinal	4	Ligatures	13	Recovered	3
42	Mr. Woodward, Portsmouth	Private House	M.	57 Nov.		Parietal	5	Ligatures	32	Recovered	4
43	Mr. Crossley, Leicester	Samar. Hosp.	S.	25 Nov.		Parietal and pelvic	4	Ligatures	20	Recovered	5
44	Mr. Royston Pike, Southsea	Ditto	M.	40 Nov.		Parietal, omental, and intestinal; cyst had been explored and drained four years back	5	Ligatures	5	Recovered	6
45	Mr. Square, Plymouth	Ditto	S.	20 Nov.		None	3	Ligatures	29	Recovered	7
46	Dr. Duplex, Torrington Square	Ditto	S.	54 Nov.		None	4	Ligatures	21	Recovered	8
47	Dr. Lorimer, Farnham	Ditto	M.	40 Dec.		Burst cyst; no adhesions	5	Ligatures	25	Recovered	9
48	Mr. Tarzwell, Sturminster Newton	Ditto	S.	30 Dec.		Parietal, omental, and intestinal; twisted pedicle	5	Ligatures	8	Recovered	10
49	Dr. Bell, Catford Bridge	Ditto	M.	37 Dec.		Parietal, omental, and intestinal	5	Ligatures	19	Recovered	11
50	Dr. Gray, Oxford .....	Ditto	M.	32 Jan.	1878	Peritoneal cysts; extensive adhesions	5	Enucleation and ligatures	10	Recovered	12

51	Mr. Reed, Pool .....	Ditto	M. 38 Jan.	Parietal, omental, and intestinal	5	Ligatures	15	Died in 28 hours: acute pleurisy	13
52	Mr. Thornton .....	Ditto	M. 29 Jan.	Parietal; burst papil- omatous cyst	4	Ligatures	16	Recovered	14
53	Dr. Lowe, Burton .....	Ditto	M. 57 Jan.	Parietal .....	5	Ligatures	24	Recovered	15
54	Mr. Spencer Wells .....	Private House	M. 31 Jan.	Suppurating cyst, ad- hering to every- thing it touched	4	Ligatures	14	Recovered	16
55	Dr. Cole, Bath .....	Samar. Hosp.	S. 20 Jan.	Parietal, omental, and intestinal; burst papilloma- tous cyst	4	Ligatures	16	Recovered	17
56	Dr. Iliff, Kennington Road	Ditto	M. 47 Feb.	Uterine and pelvic...	5	Ligatures, both ovaries	34	Recovered	18
57	Mr. Thornton .....	Ditto	W. 46 Feb.	Parietal and omental; had burst several times	5	Ligatures, both ovaries	34	Recovered	19
58	Mr. Wheeler, Bexley...	Ditto	S. 26 Feb.	None .....	4	Ligatures	15	Recovered	20
59	Mr. Bailey, Cavendish Place	Ditto	M. 54 Feb.	Parietal .....	4	Ligatures	18	Recovered	21
60	Dr. Meadows, Ipswich	Ditto	M. 29 Feb.	Omental, intestinal, and uterine; double dermoid	4	Ligatures, both ovaries	4	Recovered	22
61	Dr. Deeping, Southend	Ditto	M. 40 Feb.	Pelvic and uterine ...	4	Ligatures, both ovaries	14	Recovered	23
62	Mr. Napper, Cranleigh	Ditto	S. 42 March	Parietal and omental	5	Ligatures	20	Recovered	24
63	Mr. Glencross, Bourne	Private House	S. 16 March	Omental .....	3½	Ligatures	13	Recovered	25
64	Dr. White, Notting- ham	Samar. Hosp.	W. 38 March	Pelvic, uterine, and intestinal	6	Ligatures, both ovaries	9	Recovered	26
65	Dr. Buckell, Chichester	Ditto	W. 46 March	None .....	4	Ligatures, both ovaries	38	Recovered	27
66	Mr. Clifton, Leicester	Ditto	S. 35 March	None .....	4	Ligatures	11½	Recovered	28
67	Dr. Godfrey, Free- mantle	Ditto	M. 49 April	Parietal, omental, and intestinal	5	Ligatures, both ovaries	40	Recovered	29
68	Dr. Anderson, East India Road	Ditto	M. 50 April	Omental and intes- tinal; burst col- loid cyst	5	Ligatures	31	Recovered	30

No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Adhesions.	Length of incision.	Treatment of pedicle.	Weight of tumour.	Result.	No. in anti-septic series.
					1878		Inches.		Pounds.		
69	Mr. Meredith .....	Samar. Hosp.	M.	28 April	None .....	None .....	4	Ligatures	10	Recovered	31
70	Mr. Thornton .....	Private House	S.	24 April	None .....	None .....	3½	Ligatures	8	Recovered	32
71	Dr. Oxley .....	Samar. Hosp.	S.	57 April	Pelvic; fibroid out-growth also removed from uterus	Parietal and omental	4	Ligatures	17	Recovered	33
72	Mr. Spencer Wells .....	Ditto	W.	54 April	Parietal and omental	Parietal and omental	6	Ligatures	75	Died in 79 hours; septicæmia	34
73	Dr. Priestley .....	Nursing Home	M.	35 April	None .....	None .....	4	Ligatures, both ovaries	12	Recovered	35
74	Mr. Spencer Wells .....	Samar. Hosp.	S.	15 May	Omental .....	Omental .....	4	Ligatures	17	Recovered	36
75	Mr. Gregson, Newcastle	Ditto	S.	14 May	Omental .....	Omental .....	4	Ligatures	21	Recovered	37
76	Mr. Thornton .....	Ditto	M.	42 May	Intestinal and pelvic; slight rupture of intestine	Intestinal and pelvic; slight rupture of intestine	4	Enucleation and ligatures, both ovaries	10	Recovered	38
77	Dr. Percy Boulton ..	Ditto	S.	17 May	None .....	None .....	4	Ligatures	11	Recovered	39
78	Dr. Jenner, Baldock ..	Ditto	M.	45 May	Parietal and omental	Parietal and omental	4	Enucleation and ligatures, both ovaries	14	Died 4th day: meningitis (?)	40
79	Dr. Magrath, Teignmouth	Ditto	M.	52 May	Parietal, omental, and pelvic	Parietal, omental, and pelvic	4	Ligatures	13	Recovered	41
80	Mr. Debenham, Pres-teigne	Ditto	M.	68 June	Malignant colloid; ruptured and everywhere adherent	Malignant colloid; ruptured and everywhere adherent	5	Ligatures	17	Died 80 hours: septicæmia	42
81	Dr. Hodge, Sidmouth	Ditto	S.	35 June	Extensive and general	Extensive and general	4	Enucleation and ligatures	10	Recovered	43
82	Dr. Greenhalgh .....	Ditto	M.	34 June	Parietal, omental, intestinal, vesical, uterine, &c.	Parietal, omental, intestinal, vesical, uterine, &c.	6	Enucleation, both ovaries	48	Died: shock	44
83	Dr. Kidd .....	Ditto	S.	32 June	Extensive pelvic .....	Extensive pelvic .....	4	Enucleation	11	Recovered	45

ANTISEPTIC ABDOMINAL SECTION.

155

84	Dr. Routh .....	Ditto	M. 56 July	Pelvic of second ovary	5	Enucleation and ligatures, both ovaries	30	Died 4th day: cardiac disease	46
85	Mr. Wood, Sheephead	Ditto	M. 45 July	Omental and mesen- teric	5	Ligatures, both ovaries	27	Recovered	47
86	Dr. Roberts Law, Rich- mond	Ditto	M. 26 July	Omental, mesenteric, and uterine	5	Enucleation and ligatures	18	Died 13 hours: shock	48
87	Mrs. Sturge, M.D. ....	Ditto	M. 36 Oct.	Parietal .....	4	Ligatures	17	Recovered	49
88	Dr. Alfred Hollis, Freshwater .....	Ditto	S. 41 Oct.	None .....	4	Ligatures	10	Recovered	50
89	Dr. Fairbank, Windsor	Ditto	S. 29 Oct.	None .....	3½	Ligatures	9	Recovered	51
90	Dr. Smyth, Abergar- venny	Ditto	S. 19 Oct.	None .....	3½	Ligatures	34	Recovered	52
91	Dr. Jackson, Southsea	Ditto	S. 44 Oct.	Parietal and omental	5	Ligatures	23	Recovered	53
92	Dr. Ward Cousins, Portsmouth	Ditto	S. 44 Oct.	None .....	4	Ligatures	13	Recovered	54
93	Dr. Sullivan, Ilford ...	Ditto	M. 31 Nov.	None .....	5	Ligatures, both ovaries	10	Recovered	55
94	Dr. Champneys .....	Do. D 24 h.	S. 38 Nov.	Parietal, omental, and intestinal	4	Ligatures	16	Recovered	56
95	Dr. Percy Boulton ...	Ditto	S. 47 Nov.	None .....	3½	Ligatures	25	Recovered	57
96	Dr. Jackson, Darlington	Ditto	S. 16 Nov.	None .....	3½	Ligatures	18½	Recovered	58
97	Dr. Lewis, Basingstoke	Ditto	M. 40 Nov.	None .....	3½	Ligatures	14	Recovered	59
98	Dr. Evans, Cheshunt...	Ditto	S. 17 Nov.	Parietal and omental	3	Ligatures	13½	Recovered	60
99	Mr. Alban Doran .....	Ditto D	S. 28 Dec.	Parietal, omental, and pelvic	5	Enucleation and ligatures	29	Died 41 hours: double pleurisy	61
100	Dr. Neale, St. John's Wood	Do. D 30 h.	S. 34 Dec.	Parietal, omental, and pelvic	6	Ligatures	34	Recovered	62
101	Dr. Freeborn, Oxford	Do. Ds 43 h.	M. 33 Dec.	Universal adhesions due to rotation of peticle	3½	Ligatures, both ovaries	8	Recovered	63
102	Dr. Richmond, Graves- end	Do. D 116 h.	M. 53 March + 1879	Parietal, omental, and intestinal	5	Ligatures, both ovaries	20	Recovered	64

\* The cases down to this line have been already published ('British Medical Journal, October 19th, 1878), but are given here in order to make the table complete from first commencing Antiseptic Ovariectomy.

+ The absence of operations from December, 1878, to March, 1879, was due to illness.

No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Adhesions.	Length of incision.	Treatment of pedicle.	Weight of tumour.	Result.	No. in anti-septic section.
103	Dr. Hitchcock, Lewisham	Samar. Hosp. Ds 48 h.	S.		1879 33 March	Uterine and pelvic...	Inches. 4	Ligatures, both ovaries	Pounds. 9	Recovered	65
104	Dr. Playfair .....	Ditto	M.		42 March	None; ruptured colloid	4	Ligatures, both ovaries	18	Recovered	66
105	Mr. Graves, Junction Road	Ditto	M.		42 March	Parietal and extensive pelvic	4	Ligatures, both ovaries	15	Died 12th day : obstruction of intestines	67
106	Mr. Steward, Wolverhampton	Ditto	S.		31 March	Parietal and omental	3½	Ligatures	19	Recovered	68
107	Mr. Symonds, Oxford	Ditto Ds	S.		39 April	Parietal and omental; putrid cyst	6	Ligatures	29	Died 4 hours : hemorrhage	69
108	Dr. Thursfield, Brosely	Do. D 90 h.	S.		35 April	Parietal, omental, mesenteric, and intestinal; putrid cyst	6	Ligatures	50	Died 5th day : septicæmia	70
109	Dr. Evans, Gloucester	Ditto	M.		27 April	Extensive parietal, requiring inversion of cyst	4	Ligatures	33	Recovered	71
110	Mr. Woodruffe Smith, Sittingbourne	Ditto	M.		41 April	Parietal and pelvic...	4	Enucleation and ligatures, both ovaries	2½	Recovered	72
111	Mr. Meredith .....	Ditto	M.		30 April	Omental; ruptured cyst	5	Ligatures	27	Recovered	73
112	Mr. Thomas, Isbstock	Ditto	W.		54 April	Omental and intestinal; ruptured colloid, with acute peritonitis	5	Ligatures	17	Died 12 hours : suppression of urine	74
113	Dr. Wrench, Baslow ...	Ditto	S.		55 May	None .....	3½	Ligatures	14	Recovered	75
114	Dr. Galabin .....	Ditto	M.		50 May	None .....	3½	Ligatures	13	Recovered	76
115	Dr. Clewin Griffiths, Finsbury Square	Ditto	S.		29 May	None; ruptured cyst	5	Ligatures	11	Recovered	77

116	Dr. Hollis, Yarmouth, Isle of Wight	Private House	M. 45 May	None; ruptured cyst	4	Ligatures, both ovaries Ligatures	20	Recovered	78
117	Professor Lister and Dr. Clarke	Samar. Hosp.	S. 33 May	None	4		13	Recovered	79
118	Mr. Hemming, Kim- bolton	Ditto	S. 20 June	Parietal and omental	3½	Ligatures	18	Recovered	80
119	Mr. Royston Pike, Southsea	Do. D tentz.	M. 35 June	Parietal, omental, and intestinal; fœtid suppurating cyst with fistula	4	Ligatures	—	Recovered	81
120	Dr. Percy Boulton ...	Ditto	S. 19 June	None	3	Ligatures	8	Recovered	82
121	Dr. Launghier, Alford...	Do. D 114 h.	M. 56 July	Omental, mesenteric, intestinal, uterine, and pelvic	6	Ligatures 'Ligatures, both ovaries	10	Recovered	83
122	Dr. Galabin.....	Ditto	W. 67 July	Omental adhesions at site of rupture of cyst in 1851	4	Ligatures	25	Recovered	84
123	Mr. King, Stratton ...	Do. Ds 48 h.	S. 32 July	Parietal, omental, in- testinal, uterine, vesical, and pelvic	5	Ligatures	14	Recovered	85
124	Mr. Corner, Poplar ...	Ditto	S. 39 July	None	4	Ligatures, both ovaries	11	Recovered	86
125	Dr. Edis .....	Ditto	S. 24 July	None	3½	Ligatures	8	Recovered	87
126	Dr. Moorhead, Wey- mouth	Ditto	M. 49 July	Parietal, omental, and uterine; cyst had been tapped and drained eleven years before	3½	Ligatures	6	Recovered	88
127	Mr. Davis, Clevedon ...	Nursing Home	S. 51 July	None	3½	Ligatures, both ovaries	11	Recovered	89
128	Dr. Kidd.....	Private House	M. 42 Aug.	None	4	Enucleation and ligatures	13	Recovered	90
129	Mr. Thornton.....	Ditto	M. 41 Aug.	None; burst cyst	4	Ligatures	11	Recovered	91
130	Dr. Hensley, Bath.....	Nursing Home	S. 42 Sept.	Parietal and omental; inflamed cyst, with rotation	3½	Ligatures	6	Recovered	92
131	Dr. Pearce, Plymouth	Ditto	M. 49 Sept.	Omental and intes- tinal	7	Enucleation and ligatures	53	Recovered	93



No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Adhesions.	Length of incision.	Treatment of pedicle.	Weight of tumour.	Result.	No. in anti-septic series.
							Inches.		Pounds.		
132	Dr. Prickett .....	Samar. Hosp.	S.	1879	19 Oct.	Omental .....	3½	Ligatures	14	Recovered	94
133	Mr. Meredith .....	Ditto	W.	28 Oct.	28 Oct.	Universal adhesions; putrid cyst	7	Ligatures	82	Died: shock	95
134	Mr. Cartwright, Calne	Ditto	M.	48 Oct.	48 Oct.	Parietal .....	4	Ligatures	10	Recovered	96
135	Mr. Doran .....	Ditto	S.	36 Oct.	36 Oct.	Omental .....	6	Enucleation and ligatures	8	Recovered	97
136	Dr. Prickett .....	Ditto	M.	20 Oct.	20 Oct.	None .....	3½	Ligatures	19	Recovered	98
137	Mr. St. Quintin Bond, Havant	Ditto	S.	57 Oct.	57 Oct.	None .....	5	Ligatures	12	Recovered	99
138	Dr. Kidd .....	Ditto	S.	18 Oct.	18 Oct.	None .....	4	Ligatures, both ovaries	16½	Recovered	100
139	Dr. Jones, Sydenham Park	Private House	M.	50 Oct.	50 Oct.	None .....	4	Ligatures	17	Recovered	101
140	Mr. Short, Walsham-le-Willows	Samar. Hosp.	M.	39 Oct.	39 Oct.	None .....	3½	Ligatures	25	Recovered	102
141	Mr. Walters, Reading	Private House	M.	30 Oct.	30 Oct.	Omental .....	4	Ligatures	18	Recovered	103
142	Mr. Nash, Hatch-Beauchamp .....	Samar. Hosp.	M.	46 Nov.	46 Nov.	Extensive malignant adhesions; omental and pelvic	4	Ligatures	16	Died 5th day: exhaustion	104
143	Mr. Sers, Epperstone	Ditto	S.	34 Nov.	34 Nov.	None; semi-solid dermoid tumours of both ovaries	5½	Ligatures, both ovaries	8	Recovered	105
144	Mr. Young, Reading ...	Private House	S.	55 Nov.	55 Nov.	Parietal .....	4	Ligatures	15	Recovered	106
145	Mr. Norris, South Petherton	Samar. Hosp.	S.	26 Nov.	26 Nov.	None .....	3½	Ligatures	23	Recovered	107
146	Mr. Way, Portsea .....	(Ditto)	M.	34 Nov.	34 Nov.	Parietal and very extensive omental and intestinal	6	Ligatures	27	Recovered	108
147	Mr. E. Leslie, Alton ...	Ditto	M.	39 Nov.	39 Nov.	Parietal, omental, mesenteric, and pelvic	6	Ligatures	31	Recovered	109

148	Mr. Yate, Godalming...	Ditto	M.	59 Nov.	Extensive parietal and pelvic	4	Ligatures	17½	Recovered	110
149	Mr. Branford Edwards, Ipswich	Ditto	S.	47 Dec.	Parietal	4	Ligatures	22	Recovered	111
150	Mr. Paulson, Mount-sorrel	Ditto	M.	34 Dec.	Parietal and omental; chronic peritonitis	4	Ligatures	28½	Recovered	112
151	Dr. Hemming, Bishop's Waltham	Ditto	W.	57 Dec.	Parietal and omental; burst colloid	4	Ligatures	9	Recovered	113
152	Dr. Matthews Duncan	Private House	M.	28 Dec.	Parietal, omental, and pelvic; burst cyst	6	Ligatures, both ovaries	26	Recovered	114
153	Mr. E. Leslie, Alton ...	Samar. Hosp.	M.	45 Dec. 1880	Extensive parietal ...	4	Ligatures	38	Recovered	115
154	Dr. McClokey, Stock-ton-on-Tees	Ditto	S.	31 Jan.	Parietal and omental	4	Ligatures	34	Recovered	116
155	Mr. Spencer Wells.....	Ditto	S.	30 Jan.	None	3	Ligatures, both ovaries	10	Recovered	117
156	Dr. Watchorn, Not-tingham	Ditto	M.	38 Jan.	Parietal, omental, intestinal, and pelvic	6	Ligatures	34	Recovered	118
157	Dr. Greenhagh .....	Ditto	S.	23 Jan.	Extensive parietal, omental, and pelvic; semi-solid sarcoma	7	Ligatures and enucleation	8	Recovered	119
158	Mr. Knowsley Thorn-ton	Ditto	S.	29 Jan.	None	4	Ligatures	8	Recovered	120
159	Mr. Jowers, Brighton	Ditto	S.	61 Feb.	Very extensive pelvic and intestinal	4	Ligatures, both ovaries	19	Recovered	121
160	Dr. Cole, Bath .....	Ditto	S.	19 Feb.	None	3	Ligatures	20	Recovered	122
161	Mr. Thorne, Leaming-ton	Nursing Home	S.	20 Feb.	None	3	Ligatures	8	Recovered	123
162	Dr. Bagshawe, St. Leo-nard's	Samar. Hosp.	M.	25 Feb.	Omental	4	Ligatures	18	Recovered	124
163	Mr. Meredith .....	Ditto	M.	40 Feb.	None	4	Ligatures	10	Recovered	125
164	Dr. Prince, Bayswater	Ditto	M.	29 March	Parietal and omental; burst cyst	4	Ligatures	28	Recovered	126
165	Dr. Walker, Chester-field	Ditto	M.	35 March	Parietal and omental	4	Ligatures	49	Recovered	127

No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Adhesions.	Length of incision.	Treatment of pedicle.	Weight of tumour.	Result.	No. in anti-septic series.
					1880		Inches.		Pounds.		
166	Dr. Aldridge, Dorchester	Samar. Hosp.	M.	23	March	Extensive parietal and omental	4	Ligatures	20	Recovered	128
167	Mr. Willoughby Davis	Ditto	S.	47	March	Parietal, omental, mesenteric, and pelvic	4	Ligatures, both ovaries	20	Recovered	129
168	Mr. Nelson Kiddle, Leamington	Ditto	W.	55	March	Omental and intestinal; general peritonitis	4	Ligatures	11	Recovered	130
169	Mr. Plowman, Coventry	Ditto	S.	42	March	Extensive enucleation	5	Ligatures, both ovaries	18	Died 14th day	131
170	Mr. Maurice, Reading	Private House	M.	25	March	Parietal; solid alveolar sarcoma	6	Ligatures	4½	Recovered	132
171	Mr. Corner, Poplar	Samar. Hosp.	W.	53	March	Extensive pelvic.....	4	Ligatures and cautery, both ovaries	10	Recovered	133
172	Mr. Knowsley Thornton	Private House	S.	28	April	None .....	4	Ligatures, both ovaries	20	Recovered	134
173	Prof. Lister and Dr. Aikman, Guernsey	Samar. Hosp.	M.	30	April	Extensive pelvic and tubal	4	Ligatures and enucleation	9	Recovered	135
174	Mr. Thorne, Leamington	Private House	S.	46	April	None; fibroid outgrowth also removed from uterus	5	Ligatures	—	Recovered	136
175	Dr. Jones, Torrington	Samar. Hosp.	S.	50	April	Extensive parietal ...	5	Ligatures	22	Recovered	137
176	Mr. Knowsley Thornton	Ditto	M.	29	April	Parietal and omental	5	Ligatures	35½	Recovered	138
177	Mr. Phillips, Leinster Gardens	Ditto	S.	26	April	None .....	3½	Ligatures	16	Recovered	139
178	Dr. Haynes, Stanstead	Ditto	M.	52	April	Parietal .....	3½	Ligatures	19	Recovered	140
179	Mr. Knowsley Thornton	Private House	S.	46	April	Ruptured cyst with chronic peritonitis	4	Ligatures, both ovaries	5	Recovered	141
180	Mr. Corner, Poplar.....	Samar. Hosp.	S.	17	April	None .....	3½	Ligatures	13	Recovered	142
181	Mr. Truman, New Bas-	Ditto	M.	47	May	Parietal and omental	4	Ligatures	35½	Recovered	143

182	Mr. Watson Cheyne ...	Ditto	M.	29 May	None; burst cyst ...	3½	Ligatures	3	Recovered	144
183	Dr. Percy Boulton ...	Ditto	M.	36 May	Uterine and pelvic ...	3	Ligatures	13	Recovered	145
184	Mr. Hunt, Chagford ...	Ditto	S.	31 May	Slight parietal .....	3½	Ligatures	5	Recovered	146
185	Mr. Mason, Pontypool	Ditto	M.	35 May	Extensive parietal and pelvic	5	Ligatures	24	Recovered	147
186	Dr. Matthews Duncan and Dr. Fulcher, Burbage	Nursing Home	S.	52 May	Extensive parietal, omental, and pelvic	5	Ligatures	23	Recovered	148
187	Dr. W. H. Day .....	Samar. Hosp.	M.	35 May	None .....	3½	Ligatures	10	Recovered	149
188	Dr. Galatin.....	Ditto	M.	32 June	Very extensive parietal, omental, intestinal, vesical, and pelvic; semi-solid sarcoma	8	Ligatures and enucleation	13	Recovered	150

The letter D, inserted under "Place of Operation" in order to be conspicuous, marks the cases in which the glass drainage tube was used; the small s following it, the cases in which a special tube suture was used.

*Incomplete Ovariectomies. Operations performed Antiseptically.*

No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Particulars.	Result.	No. in anti-septic series.
3	Mr. Newstead, Clifton	Samar. Hosp.	S.	38 Oct.	1877	Exploratory incision. Malignant tumour, involving both ovaries, uterus, &c. Cysts opened, and three pints of fluid removed. Incision closed. No drain	Recovered, and died at home 5 months after-wards	1
4	Dr. Rice, Cadogan Place	Private house	S.	39 Sept.		Exploratory incision. Malignant disease of both ovaries, peritoneum, &c. Removal of most of one tumour and of fluid contents of the other. Glass drainage tube	Died in 40 hours. Exhaustion. Septicæmia(?)	2
5	Dr. Monat, Swansea ...	Samar. Hosp.	M.	49 May	1879	Exploratory incision. Papillomatous tumours of both ovaries, with extensive peritoneal infection and large fibroids of uterus. Removal of fluid and large masses of papilloma. No drain	Recovered	3
6	Mr. Jepson, Durham...	Nursing home	M.	63 Aug.		Exploratory operation. Cancerous tumour of left ovary; considerable separation of adhesions. Operation given up on finding extensive intestinal adhesions. No drain	Recovered: died at home in 2 months (cancer of stomach)	4
7	Mr. Dobson, Leeds ...	Samar. Hosp.	M.	21 Oct.		Exploratory incision. Ovarian cyst universally adherent, after threeappings before she came under my care. Prolonged attempt to remove it. Small portions of cyst removed. Septicæmia. Fæcal fistula. Glass drainage tube	Died in 3 weeks, exhausted by prolonged discharge and fæcal fistula	5
<i>Exploratory Operations with Simple Removal of Fluid (Antiseptic).</i>								
4	Mr. Owen Willis, Monmouth	Private house	M.	—	1877	Exploratory incision. Large ovarian cyst with universal adhesions; had been tapped without	Died in 48 hours. Septicæmia	1

5	Mr. Tarzwell, Sturminster, Newton	Samar. Hosp.	M. 50 March 1879	and in low typhoid condition, with epiphora of mouth, &c. Fluid removed, cyst sponged out, and incision closed	2	Recovered
6	Dr. Parsons, Dover	Private house	M. 47 Oct.	Exploratory incision. Papilloma bearing cyst universally adherent, and extensive infection of peritoneum. Fluid removed, and incision closed. No drain	3	Died in 28 hours. Exhaustion
				Exploratory incision. Enormous fibroid uterus with extensive intestinal and other adhesions. Large thin cysts, either fibro-cysts of uterus or cysts of left ovary, full of <i>fætid</i> fluid and lymph and old clot. Sponged out and incision closed		

*Hysterectomies and Abdominal Sections for Removal of Uterine Tumours (Antiseptic).*

3	Mr. Moore, Bourton-on-the-water	Samar. Hosp.	M. — May 1878	Exploratory operation. Removal of tumour involving uterus and both ovaries. Universal adhesions. Rupture of left external iliac artery. Clamp applied just above vaginal portion of uterus	1	Died of shock a few minutes after she was placed in bed
4	Mr. Hingston, Liskeard	Ditto	S. 45 Nov.	Exploratory operation. Removal of fibroid uterus, weighing six pounds, and right ovary. Ligatures applied after division of uterus, just above cervix, with actual cautery. Right ovary removed, and some cysts in right broad ligament opened. Rallied well after operation, but six hours later became suddenly collapsed. I came just at the time, and at once opened the wound and found peritoneum full of blood, but could not find the bleeding vessel. Right broad ligament open and full of clot. Weight 6 lbs.	2	Died 8 hours after operation from hæmorrhage; right uterine and spermatic arteries

No.	Medical attendant.	Place of operation.	Condition.	Age.	Date of operation.	Particulars.	Result.	No. in anti-septic series.
5	Mr. Lakin, Leicester...	Samar. Hosp.	M.	39	1879 May	Exploratory operation during pregnancy. Large solid tumour impacted and adherent in pelvis. On removal it turned out to be a uterine outgrowth. Pedicle secured by silk ligatures after transfexion. Dead child born eighteen hours after operation. Tumour weighed 5½ lbs.	Died 5th day. Acute enteritis and obstruction	3
6	Dr. Roberts Law, Richmond	Ditto	M.	40	May	Exploratory operation. Large fibroid uterus with such pelvic connections that its removal was impossible. Incision closed	Recovered. Well in July, 1880	4
7	Mr. Day, Lower Edmonton	Ditto	M.	46	June	Exploratory operation. Removal of enormous cystic sarcoma of uterus, weighing 62 lbs. Extensive adhesions. Pedicle clamped. No drain.	Recovered. Is in perfect health, July, 1880	5
8	Dr. Clement Godson ...	Ditto	S.	38	Nov.	<i>Vide</i> Medical Times and Gazette, Oct., 1879 Removal of large fibroid uterus with outgrowths, and both ovaries. Ovarian pedicles ligatured. Clamp applied to uterus just above vagina. Weight, 5 lbs.	Recovered. Is in perfect health, July, 1880	6
9	Mr. King, Stratton ...	Private house	S.	34	Dec.	Removal of large and small fibroid outgrowths from uterus without opening its cavity. Pedicles secured by silk ligatures. Right ovary and tube also removed. Weight, 4 lbs.	Recovered. Is in perfect health, July, 1880	7
10	Mr. Hemming, Kimbolton	Samar. Hosp.	M.	44	1880 Feb.	Removal of fibroid (soft) outgrowth from uterus. It involved the right angle of the fundus uteri. Clamp applied on the uterus. Uterine cavity opened. Extensive parietal and intestinal adhesions. Right ovary also removed. Weight, 4 lbs. Free fluid, 4½ pints	Died 4th day. Septicæmia: sloughing of uterus below the clamp	8
11	Dr. Russel, Workop, and Dr. Percy Boulton	Ditto	M.	41	Feb.	Enucleation of a cyst from the uterine wall. Weight, 4 lbs.	Recovered	9

12	Mr. Marriott, Swaffham	Private house	S.	44 March	Removal of fibro-cyst of uterus, together with small cystic left ovary. Pedicles ligatured. Uterine cavity not opened. Weight, about 10 lbs.	Recovered. Is in perfect health, July, 1880	10
13	Dr. Fox and Mr. Green, Bath	Ditto	S.	37 May	Removal of three uterine outgrowths, with cystic left ovary. Pedicles ligatured. Weight, 4½ lbs.	Recovered. Is in perfect health, July, 1880	11
14 } 15 }	—	—	—	—	Included in Ovariectomy Table, cases 71 and 174 ...	Both recovered, and are well, 1880	12 } 13 }

*Other Abdominal Sections performed Antiseptically.*

1	Mr. Thornton.....	Samar. Hosp.	M.	42 Aug. 1877	Removal of painful omental hernia some months after ovariectomy. Some adherent coils of intestine also separated from the cicatrix	Recovered	1
2	Mr. Izod, Tottenham...	Ditto	M.	32 March 1878	Removal of hydatids of the omentum and from the pelvis during seventh month of pregnancy. Living child born a week after operation. <i>Vide</i> 'Medical Times and Gazette,' November 16th, 1878	Recovered. Remained well some time, but has lately died of hydatids in lung	2
3	Dr. W. H. Day .....	Ditto	S.	7 Jan. 2 1880	Removal of left kidney for hydronephrosis. <i>Vide</i> 'Lancet,' June 5th, 1880	Recovered. Is now quite strong, and much grown. July, 1880	3



1700

TWO HUNDRED ADDITIONAL CASES,  
COMPLETING  
ONE THOUSAND CASES OF OVARIOTOMY,  
WITH REMARKS ON  
RECENT IMPROVEMENTS IN THE OPERATION.

BY

T. SPENCER WELLS, F.R.C.S.,  
VICE-PRESIDENT OF THE ROYAL COLLEGE OF SURGEONS; SURGEON TO  
THE QUEEN'S HOUSEHOLD; CONSULTING SURGEON TO THE  
SAMARITAN HOSPITAL.

---

Received December 14th, 1880—Read February 22nd, 1881.

THE whole of my practice of ovariectomy has been brought before this Society in successive papers between 1859 and 1877, and all the cases, from the first to the eight hundredth, have been arranged in tables similar in form to that which I have the honour to present this evening. The two hundred cases now tabulated bring up the total number of cases of completed ovariectomy in my own practice up to June, 1880, to one thousand.

The total number of deaths among the 1000 patients has been 231, while 769 have recovered. A very large proportion of those who recovered have remained in good health. Many have had one or more children since the operation. In a very few the ovary not removed at the first operation has become diseased and has been removed, generally with success, by a second ovariectomy. In some cases the patients have died at an advanced age, or of

some disease quite unconnected with the operation; death from a recurrence of ovarian disease, or from malignant disease where malignancy of the ovarian growth had been observed or suspected, having been quite exceptional. The exact numbers may be ascertained by reference to the tables.

It is with great gratification that I now bring before the Society evidence proving that in successive series of cases—in other words, with increasing experience or greater knowledge—the mortality after the operation has progressively diminished. The number of deaths in each series of 100 cases, from 34 in the first 100, and 28 in the second, was 23, 22, 20, 28, 24, 24, 17, and 11. The remarkable diminution in the mortality of the ninth and tenth series of 100 cases coincided with modifications in the mode of operating, to which I shall presently refer. The total mortality of the 1000 cases has been 23·1 per cent. But, while that of the first 100 was 34, that of the last 100 was 11, or, in 1880, less than a third of the mortality in 1860.

At the end of 1877 I ceased to operate in hospital. All the cases since January, 1878, commencing with the 888th case, having been in private practice. But I have shown in former papers that there has not been any considerable difference in the results of my hospital and private practice; and it is noteworthy that during the last two years of my hospital practice—in 1876 and 1877—I had only 7 deaths in 71 hospital cases, rather less than 10 per cent., a better result than in my last series of 100 cases exclusively in private practice.

With the beginning of 1878, and the limitation of my practice to private patients, must also be associated the commencement of the testing of what are called “antiseptic precautions,” or the details of the “Listerian method.” Long before Mr. Lister had tried any of his methods, indeed, from the very beginning of my practice of ovariectomy, I had insisted upon all possible care in protecting patients before, during, and after operation

from all the known causes of excessive mortality, and I took unusual precautions against any risk of contagious or infectious disease being communicated to a patient, and against the entrance from without, or the development from within, of anything which could set up traumatic fever or blood-poisoning. I contended that obstetrics and operative gynaecology should seldom be permitted in the same building, or by the same surgeon in private practice; and that such an operation as ovariectomy should never be performed when patients with uterine cancer, or offensive discharges of any kind, may pollute the place. In 1875, a separate branch of the Samaritan Hospital was opened, and since that year the surgical wards have been much freer from such sources of danger. The good effects of this change were noted before other antiseptic measures were insisted on. And cleansing or purification of the ward or room, of everything about the operating table and bedding, of the patient herself and the parts near the seat of operation, of the surgeon, assistants, and nurses, and of all the instruments, sponges, and water used, had gradually become more complete before carbolic acid was used, or any antiseptic precaution added to those adopted before 1878. But in no series of 100 cases had I succeeded in reducing the mortality below 17. Then in the last series of 100 cases, all done antiseptically, the mortality fell to 11. Of the 13 cases, all antiseptic, from 888 to 900, only 1 died. So that the deaths in 113 cases since adopting more complete antiseptic precautions were 12, a mortality of 10·6 per cent. If I may be permitted to add 21 cases, done since the completion of the thousand, with only 1 death, the total number of antiseptic ovariectomy cases in my practice amounts to 134, with 13 deaths, a mortality of 9·7 per cent.

Before inquiring how far this smaller mortality may be due to the additional antiseptic precautions, or to other causes, I will explain precisely what the additions or changes have been.

As the material for tying vessels and uniting the wound, the same pure twisted silk, unmixed with any vegetable fibre, which I have trusted to for about twenty years had been used. I have never tried catgut; and after trial, have abandoned whipcord, hempen ligatures, silver, iron and platinum wire, horsehair and other materials. Various forms of quilled and twisted sutures have also been tried and abandoned. But since 1878, all the silk for ligatures and sutures has been soaked before use in a five per cent. solution of carbolic acid or phenol.

Dry dressing of the wound has been continued; but in place of the pads formerly used, of 5 per cent. of oil of tar with 95 per cent. of chalk, either thymol gauze, or cotton pads charged with borax or phenol have been used. These are more comfortable to the patient, and are better absorbents of moisture. As a rule, they are not touched before the seventh or eighth day, when the sutures are removed, and the wound is almost invariably found to be completely united.

The two most important additions to previous antiseptic precautions are, first, carbolising the sponges and instruments, and secondly, the use of the spray. I had long insisted on the great importance of always using perfectly pure sponges, and I believe this object is more perfectly attained by soaking them in a carbolised solution after washing, than by washing alone.

After an operation, I continue my old plan of keeping the cleansed sponges in a weak solution of sulphurous acid. And during the operation, in addition to washing in pure water, every sponge before use is wetted with a 2 to 3 per cent. solution of carbolic acid or absolute phenol. Soft, clean linen cloths, wetted with a warm solution of phenol, may be used to lessen the number of sponges required; and nurses must be cautioned not to put any of the soiled sponges into the solution until after they have been washed, otherwise albumen may be so coagulated as to prevent thorough cleansing. As nurses often fall into this error, it is well to have two or three

different sets of sponges, all carefully numbered, kept separate for the successive steps of the operation.

Nearly all the instruments used in ovariectomy may be protected from rust by a coating of nickel. They are then more easily and thoroughly cleaned after use, and the cleaned instruments should be placed before, and replaced during, the operation in trays or dishes filled with a warm solution of phenol.

These additional precautions as to sponges, silk, and instruments, I believe to be really important. I feel still doubtful about the spray. In prolonged operations, I have had reason to fear that its chilling effect upon the patients has been injurious. But I have never once seen any other ill effect which I could attribute to it, nor anything like carbolic poisoning. The misty cloud occasionally obscures the field of operation, but not to any serious extent, and it is always easy to protect the peritoneal cavity by a large warm sponge against the continued action of the spray. After a few trials I gave up thymol spray as useless, and for more than a year past have used a spray of absolute phenol of a strength of one in forty. And this I continue to use, believing it to be safer than the irrigation or sponging proposed as substitutes, although I fully admit that we require a far greater number of trustworthy experiments, or of comparative observations made under similar conditions with and without spray than have yet been made known, before we can receive any satisfactory answer to the questions whether carbolic vapour or air can destroy or render innocuous, infective, or putrefactive substances or germs floating in the air; or what is the share which the spray, among other additional antiseptic precautions, has had in obtaining the better results which have undoubtedly accompanied their combined employment.

On carefully going over the notes of all the cases to ascertain if the smaller mortality in those treated antiseptically could be due to any other cause, the only modification in the mode of operation which calls for further

remark is the very much more frequent, almost constant, employment of the *intra*-peritoneal treatment of the pedicle since the trial of the antiseptic system was begun. But before that time, the *extra*-peritoneal treatment had been by far the more successful in my practice. When comparing the results of the two methods at the College of Surgeons in June, 1878, I showed that of 627 *extra*-peritoneal cases, 130 had died, or 20·73 per cent., while of 157 *intra*-peritoneal cases, 60 died, or 38·2 per cent., the mortality with the ligature having been nearly double that of the clamp. I am quite sure that, as has been suggested, the *extra*-peritoneal did not represent the simple, and the *intra*-peritoneal the complicated cases. The difference was simply that of long or short pedicle. Whenever the pedicle was long enough, I used to employ a clamp whatever might be the complications of the case; and in short pedicles I used the ligature or cautery, whether the case was otherwise simple or the reverse. To my mind, one great merit of the antiseptic system is that it has made the *intra*-peritoneal method, which was formerly the less, now the more successful method of dealing with the pedicle. Formerly, septic changes, which are now scarcely ever observed, frequently took place in or about the tied pedicle, and the many disadvantages of the *extra*-peritoneal method, which were only counter-balanced by its greater success, have no longer to be endured.

Another great gain from the antiseptic system is that drainage of the peritoneal cavity is now scarcely ever necessary. In the paper which I brought before this Society on completing 800 cases, I contended that drainage should only be an exceptional practice. But I did not then imagine that it could be almost entirely discarded. I can now say that I have not drained one case in which antiseptic precautions have been taken; and on looking back I cannot believe that there are more than two in which, if a drainage tube had been used, it could have been useful. The simple explanation is, that the mixture

of blood, other fluids, and air left in the peritoneal cavity, or oozing into it after operation, formerly went through putrefactive changes, and if not drained off produced septicæmia, whereas now no putrefaction takes place and absorption is quite harmless.

My own experience has not only convinced me that by the use of antiseptics—especially of phenol—the success of ovariectomy has been remarkably increased, that a much smaller proportion of deaths to recoveries has been obtained; but, further, that those who have recovered have suffered much less from fever, while convalescence has been more rapid than it used to be. Formerly, temperatures of  $100^{\circ}$  to  $103^{\circ}$  were usual, and  $104^{\circ}$  to  $107^{\circ}$  not very uncommon. And the head was cooled by ice in at least half the cases. Now, cold to the head is scarcely ever thought of, certainly not used in one case in twenty, and a temperature of  $102^{\circ}$  is rare. Recovery with a temperature which never rises above  $100^{\circ}$  is the rule.

It would occupy too much time if, in this evening's meeting, I were to review the progress of ovariectomy from the revival of the operation which followed the discussion on my first five cases in this room twenty years ago. I must content myself with the knowledge that an operation which was then a rare and exceptional event in this country and still more so abroad, which had been discredited in more than one important discussion in this Society, and which was then truly regarded as one of the most fatal of surgical operations, is now so frequently performed that several surgeons at home and abroad number their cases by the hundred, that sufficiently full details of more than 3000 cases can be grouped together for study, and that an average mortality of about 10 per cent. has already been attained by several operators.

Surely these facts should encourage the hope that in the future, even this small mortality will be considerably smaller.



## TWO HUNDRED ADDITIONAL CASES OF OVARIOTOMY. BY T. SPENCER WELLS, V.P.R.C.S.

No.	Medical attendant.	Date of operation.	Age.	Condition.	Adhesions.	Treatment of Pedicle.	Weight of tumour.	Length of incision.	Result.	Subsequent history or cause of death.
		1876					Pounds.	Inches.		
801	Dr. Daley, Hull	Oct.	50	Single	None	Ligature	12	4	Recovered	Well in 1881.
802	Mr. Mould	Oct.	64	Widow	Omental	Clamp	25	5	Recovered	Died Sept. 1878. Cancer of liver.
803	Hospital	Oct.	25	Single	Parietal and omental	Clamp	18	5	Recovered	Married in 1880. Boy in 1881. Well in 1881.
804	Dr. Giles, Oxford	Oct.	30	Single	None.	Ligatures	11	4	Recovered	Well in 1881.
805	Mr. Appleby, Newark	Oct.	32	Widow	Omental. Both ovaries	Ligatures	16	5	Recovered	Well in 1881.
806	Mr. Tarleton, Stockton	Oct.	28	Married	Parietal	Clamp	12	5	Recovered	Well in 1881.
807	Hospital	Nov.	39	Single	None	Ligatures	10	5	Recovered	No return.
808	Dr. Paine, Cardiff	Nov.	56	Married	Parietal. Suppurating cyst	Clamp	19	5	Recovered	Well in 1881.
809	Hospital	Nov.	23	Single	Parietal	Ligatures	16	5	Recovered	Married in 1878.
810	Dr. Gage Brown	Nov.	21	Single	None	Ligature	15	5	Recovered	Died 7 months after. Cancer of lung.
811	Hospital	Nov.	36	Married	Omental	Clamp	24	5	Recovered	No return in 1881.
812	Hospital	Nov.	19	Single	Omental	Clamp	28	5	Recovered	Three children born since. Well in 1881.
813	Hospital	Nov.	22	Single	Parietal and omental	Ligature	25	5	Recovered	One child since operation; now pregnant. Well in 1881.
814	Dr. Leadam	Nov.	34	Married	Parietal	Clamp	11	5	Recovered	Well in 1881.
815	Hospital	Dec.	36	Married	Intestinal and pelvic	Ligature	23	8	Recovered	
816	Mr. E. Barker	Dec.	16	Single	Parietal and omental	Ligature	13	5	Recovered	



No.	Medical attendant.	Date of operation.	Age.	Condition.	Adhesions.	Treatment of Pedicle.	Weight of tumour.	Length of incision.	Result.	Subsequent history or cause of death.
							Pounds.	Inches.		
886	Dr. Myrtle, Harrogate ...	1877 March	49	Single	Parietal and intestinal	Ligature, both ovaries	9	5	Died, 5th day	Septicæmia.
887	Dr. March, Wandsworth	March	42	Married	None	Ligature	7	5	Recovered	Died 5 months after of cardiac disease.
888	Hospital	April	47	Widow	None	Clamp	19	5	Recovered	No return.
889	Hospital	April	32	Married	Pelvic	Ligature, both ovaries	28	6	Died, 5th day	Septicæmia.
840	Dr. Nebel, Heidelberg ...	April	36	Married	Parietal and omental	Ligature, both ovaries	32	5	Recovered	Well in 1881.
841	Dr. Clark, Dunster .....	April	42	Single	Parietal, omental and vesical	Ligature, three ovaries ?	21	5	Died, 10 hrs.	Hæmorrhage.
842	Hospital	April	25	Single	Parietal and omental	Clamp and ligature, both ovaries	17	5	Recovered	Well in 1881.
843		April	26	Single	None	Clamp	9	5	Recovered	Well in 1881.
844	Hospital	May	28	Married	Parietal and intestinal	Clamp	15	5	Recovered	Well in 1881.
845	Hospital	May	23	Single	None	Clamp	16	5	Recovered	Married in 1879. One child in 1880. Well in 1881.
846	Hospital	May	40	Married	None	Clamp	27	5	Recovered	Well in 1881.
847	Dr. Drake, Exeter .....	May	33	Married	Vesical	Clamp	10	5	Recovered	Died. Cancer.
848	Dr. Manson, Chesterfield	June	54	Single	None	Ligature	29	4	Recovered	Died, 36 hrs.
849	Mr. Greaves, Bishop's Waltham	June	28	Single	Parietal and omental	Ligature, both ovaries	15	4	Died, 36 hrs.	Hæmorrhage
850	Dr. Stewart, Glanlough...	June	46	Married	Parietal, intestinal and pelvic	Forceps and ligature	10	5	Died, 68 hrs.	Septicæmia.
851	Hospital	June	27	Single	Parietal	Clamp	7	4	Recovered	Well in 1881.

852 Dr. Beddoe, Clifton .....	June	Married	Parietal and omental	Clamp	19	5	Recovered	Well in 1881.
853 .....	June	Married	None	Ligature	17	5	Recovered	Well in 1880.
854 Mr. Coryn, Brixton .....	June	Single	None	Clamp	28	4	Recovered	
855 Hospital .....	June	Single	Omental	Ligature	10	5	Recovered	Well in 1881.
856 Dr. Latham, Cambridge .....	June	Single	None	Clamp	13	5	Recovered	Well in 1881.
857 Dr. Drage, Hatfield .....	July	Married	None	Ligature	13	6	Recovered	Well in 1880.
858 Hospital .....	July	Single	Omental	Clamp	12	5	Died, 5th day	
859 Dr. Kinneir, Malmesbury .....	July	Widow	None	Clamp	17	5	Recovered	Well in 1881.
860 Hospital .....	July	Married	Parietal	Clamp	21	5	Recovered	One child since.
861 Hospital .....	July	Married	Parietal and omental	Clamp	8	6	Recovered	Well in 1881.
862 Dr. Hermann, South Africa .....	July	Married	None	Clamp	...	5	Recovered	Two children since operation. Well in 1881.
863 Dr. Lennard, Clifton .....	July	Married	Parietal, omental and intestinal	Clamp	11	5	Died, 56 hrs.	Well when last heard of.
864 Mr. Shaw, Sheffield .....	July	Widow	Parietal, omental and hepatic	Clamp	...	5	Died, 8th day	Peritonitis.
865 Hospital .....	July	Married	Omental	Ligature	13	9	Recovered	No return.
866 Hospital .....	July	Single	Mesenteric	Ligature, both tubes	6	6	Recovered	Married in 1878.
867 Dr. Craig, Montreal, Canada .....	July	Married	Omental and parietal	Clamp	...	5	Recovered	Well in 1881.
868 Hospital .....	Aug.	Married	None	Clamp	35	6	Recovered	Child after return to Canada. Well.
869 Mr. Winter, Brighton .....	Aug.	Married	Parietal	Clamp	...	5	Recovered	Child born 1880.
870 Dr. Aveling, Clapton .....	Sept.	Married	None	Clamp	15	5	Recovered	Well in 1880.
871 Dr. Tilley, Brigg .....	Sept.	Married	Omental	Ligature	7	5	Recovered	Well in 1881.
872 Dr. Grant .....	Sept.	Married	Intestinal	Ligature, both ovaries	20	5	Died, 3rd day	
873 Hospital .....	Oct.	Widow	None	Clamp	33	5	Recovered	Well in 1881.
874 Mr. Pratt, Wivlescombe .....	Oct.	Single	Parietal	Clamp	78	5	Died, 3rd day	Septicæmia.
875 Hospital .....	Oct.	Married	Omental	Clamp	18	5	Died, 5th day	
876 Hospital .....	Oct.	Single	Parietal and omental	Clamp	29	5	Recovered	Well in 1881.
877 Dr. Hadden, Manchester .....	Nov.	Single	None	Clamp	...	5	Died, 8th day	
878 Hospital .....	Nov.	Single	None	Clamp	23	5	Recovered	Well in 1881.

No.	Medical attendant.	Date of operation.	Age.	Condition.	Adhesions.	Treatment of Pedicle.	Weight of tumour.	Length of incision.	Result.	Subsequent history or cause of death.
879	Mr. Stirling	1877 Nov.	28	Married	None.	Pregnant ...	Pounds. 10	Inches. 4	Recovered	Three children born since. Wall in 1881.
880	Hospital	Nov.	68	Married	Palvic	Ligature	26	5	Recovered	Well in 1881.
881	Dr. Zanobini, Genoa	Nov.	26	Married	None	Clamp	19	5	Recovered	Well in 1880.
882	Mr. J. Murray, Brighton	Nov.	57	Widow	Omental	Ligature	21	5	Died, 14th day	Well in 1880.
883	Dr. Cooper Key	Dec.	50	Married	Parietal	Clamp	17	5	Recovered	Well in 1880.
884	Hospital	Dec.	31	Single	None	Clamp	13	5	Recovered	Well in 1881.
885	Hospital	Dec.	34	Married	Omental and parietal	Clamp	15	5	Recovered	Well in 1881.
886	Hospital	Dec.	27	Married	Omental and parietal	Clamp	12	5	Recovered	Well in 1881.
887	Dr. M. Duncan	Dec.	59	Single	Intestinal	Ligature	...	5	Died, 9th day	Septicæmia.
888	Dr. Frank, Cannes	1878 Jan.	49	Married	None	Ligature, both ovaries (Battay)	...	3	Recovered	Well in 1881.
889	Mr. Gilbert, Hackney	Feb.	60	Widow	None	Ligature	23	5	Recovered	Died in 1879. Died of malignant disease 4 months after operation.
890	Dr. Mallett, Bolton	Feb.	29	Married	Omental. Burst cyst	Clamp	...	6	Recovered	Well in 1881.
891	Dr. Carpenter, Croydon	Feb.	41	Single	Parietal and omental	Ligature	...	6	Recovered	Died of phthisis in 1879.
892	Mr. Clover	Feb.	44	Widow	None. Burst cyst...	Ligature	...	5	Recovered	Well in 1880.
893	Mr. Morgan	March	63	Single	None	Ligature	23	5	Recovered	Well in 1881.
894	Dr. Cohn, Hamburg	April	21	Married	None	Ligature, both ovaries	...	5	Recovered	Well in 1880.
895	Dr. Way	April	52	Single	None	Ligature	15	5	Recovered	Well in 1881.
896	Mr. Robinson, Huddersfield	May	56	Widow	Omental. Burst cyst	Ligature	9	4	Recovered	Well in 1881.
897	Dr. Edith Peachey, Leeds	May	23	Single	Parietal	Ligature	23	5	Recovered	Well in 1881.
898	Dr. Brown, Rochester	June	23	Married	Omental	Ligatures	8	4	Died, 7th day	Tetanus.
899	Mr. Johnston, Leicester	June	24	Married	None	Ligatures	8	4	Recovered	Well in 1881.

900	Dr. Risdon Bennett	June	57	Married	None	Ligatures	18	5	Recovered	Well in 1881.
901	June	31	Single	Palvic	Ligatures	Ligatures	10	5	Recovered	Well in 1881.
902	Dr. F. Farre	June	63	Single	None	Ligatures	18	5	Died, 4th day	Septicæmia.
903	Mr. Treves, Margate	June	68	Married	None	Ligatures, both ovaries	...	5	Recovered	Died in 1879.
904	Mr. Marshall, Birmingham	July	68	Single	Intestinal	Ligature	...	5	Recovered	Died in 1880.
905	Mr. Hayes, Tittensor	July	33	Single	Cæcal	Ligature	33	4	Recovered	Cancer.
906	Mr. C. Hawkins, Cheltenham	July	42	Married	None	Clamp	...	5	Recovered	Married since. Child in 1880.
907	Mr. Hanks, Snaith	July	42	Single	None	Ligatures	18	5	Recovered	Well in 1881. Two children since. Well in 1881.
908	Mr. Carver, Fulham	Aug.	40	Married	None	Ligatures	7	5	Recovered	Died of peritonitis in 1880.
909	Dr. Walters, Reigate	Aug.	—	Married	Parietal and omental	Ligature	12	6	Recovered	Well in 1881.
910	Dr. Cronin	Aug.	61	Widow	Parietal. Suppurating cyst	Clamp	31	6	Recovered	Well in 1880.
911	Dr. Jack, Hampton Court	Aug.	63	Single	Parietal	Ligature, both ovaries	31	5	Died, 7th day	Septicæmia.
912	Dr. Cumming, Belfast	Sept.	38	Married	Omental & intestinal	Ligature	22	6	Recovered	Well in 1880.
913	Mr. Manley Sims	Oct.	27	Married	Parietal and intestinal.	Ligature	...	6	Recovered	Well in 1881.
914	Mr. Cheyne	Oct.	50	Single	None	Burst cyst	...	4	Recovered	Well in 1881.
915	Mr. Evershed, Hampstead	Oct.	58	Widow	None	Ligature, both ovaries	22	6	Recovered	Well in 1881.
916	Mr. Collambell	Oct.	46	Married	Intestinal	Ligature	...	5	Recovered	Well in 1881.
917	Dr. Sanderson	Nov.	40	Single	Omental, parietal and pelvic	Ligature	15	5	Recovered	Died after removal of foreign body from bladder.
918	Dr. C. Pearce, Brixton	Nov.	59	Widow	Parietal and mesenteric	Ligatures	63	6	Died, 4th day	Bronchitis.
919	Dr. Bell, Preston	Nov.	46	Married	Parietal and intestinal	Ligature	...	5	Recovered	Well in 1881.
920	Dr. Rooke, Cheltenham	Nov.	—	Married	Parietal	Ligatures, both ovaries	11	5	Recovered	Well in 1881.

No.	Medical attendant.	Date of operation.	Age.	Condition.	Adhesions.	Treatment of Pedicle.	Weight of tumour.	Length of incision.	Result.	Subsequent history or cause of death.
921	Dr. Priestley .....	1878 Dec.	61	Married	Parietal and intestinal	Ligature	Pounds. 21	Inches. 5	Recovered	Well in 1881.
922	Dr. Duke, Norwood .....	Dec.	51	Married	Parietal and intestinal	Ligature	16	5	Recovered	Well in 1881.
923	Mr. T. Smith .....	1879 Jan.	32	Married	None	Ligatures	..	5	Recovered	Well in 1881.
924	Dr. Holman, Reigate .....	Jan.	19	Single	None	Ligature	16	4	Recovered	Well in 1881.
925	Mr. Knaggs, Huddersfield	Feb.	46	Married	Parietal and omental	Ligatures, both ovaries	..	5	Died, 7th day	Obstructed intestine.
926	Mr. Riddle, Leamington	Feb.	59	Married	None	Ligatures	16	5	Recovered	Well in 1881.
927	Mr. Covey, Alresford .....	Feb.	60	Single	None	Ligature	16	5	Recovered	Well in 1881.
928	Dr. Lee, Hull .....	Feb.	42	Single	None	Ligature, both ovaries	..	5	Recovered	Well in 1881.
929	Dr. Marion Sims .....	Feb.	45	Married	Cæcal	Ligature	7	5	Recovered	Well in 1881.
930	Dr. F. Weber .....	March	51	Single	None. Burst colloid	Ligature	..	5	Recovered	Well in 1880.
931	Dr. McDonnell, Dublin .....	March	36	Single	None	Ligature	..	4	Recovered	Well in 1881.
932	Dr. Greenidge, Barbadoes	March	19	Single	Parietal and omental	Ligature	14	5	Recovered	Well in 1881.
933	Mr. Bell, New Brighton	March	39	Single	Omental and intestinal	Ligature, both ovaries	11	5	Died, 4th day	Septicæmia.
934	Mr. Parsons, Frome .....	March	59	Widow	None	Ligature	9	5	Recovered	Well in 1881.
935	Mr. Bishop, Tonbridge .....	March	19	Single	Omental	Ligature	16	5	Recovered	Well in 1881.
936	Dr. Waller, Sydenham .....	April	32	Married	Parietal	Ligature	18	5	Recovered	Well in 1881.
937	Dr. Jackson, Southsea ..	April	68	Single	None	Ligature	15 lb., roma, 26 ascites	10	Recovered	Well in 1881.
938	Mr. Bickersteth, Liver- pool	April	52	Single	None. Fallopian pa- pilloma, ascites	Ligature	..	4	Recovered	Well in 1881.
939	Dr. Matheson .....	May	41	Married	Parietal and intestinal	Ligature	..	5	Recovered	Well in 1881.
940	Dr. Paget, Cambridge ..	May	54	Married	None	Ligature	..	5	Recovered	Well in 1880.

941	Mr. Whiting, Croydon...	May	47	Married	Pelvic	Ligature	...	5	Recovered	Well in 1880.
942	Dr. Kidd, Dublin	May	34	Single	None	Ligature	25	5	Recovered	Well in 1880.
943	Dr. O'Connor	May	60	Married	Parietal, omental and pelvic	Ligature, both ovaries	47	5	Recovered	Died, 4 months after operation, of bronchitis.
944	Dr. Higginbotham, St. Petersburg	May	28	Single	None	Ligature	16	4	Recovered	
945	Dr. Glover	May	36	Married	Parietal	Ligature	...	5	Recovered	
946	Dr. Glover	May	61	Married	Omental	Ligature, both ovaries	20	5	Recovered	Well in 1881.
947	Dr. —, Moscow	May	24	Married	Parietal and intestinal	Ligature, both ovaries	10	6	Recovered	Well in 1880.
948	Mr. Keetley, Grimsby	May	20	Single	Pelvic. Burst cysts	Ligature, both ovaries	...	5	Recovered	Well in 1881.
949	Dr. Hunter, Matlock	June	32	Single	None	Ligature	19	5	Recovered	Well in 1881.
950	Mr. Chapman, Tooting	June	62	Single	None	Ligature	13	5	Recovered	Well in 1881.
951	Mr. Furner, Brighton	June	33	Single	None	Ligature	14	4	Recovered	Well in 1881.
952	Mr. Newstead, Clifton	June	51	Single	None	Ligature	...	4	Recovered	Well in 1881.
953	Mr. Hewetson, York	June	38	Married	Pelvic	Ligature, both ovaries	10	5	Recovered	Well in 1881.
954	Mr. Johnson, Bedford	July	28	Single	None	Ligature	10	5	Recovered	Well in 1880.
955	Dr. H. Weber	July	50	Married	None	Ligature	28	5	Recovered	Well in 1880.
956	Dr. Muller, Norwood	July	13	Single	None	Ligature	8	5	Recovered	Well in 1881.
957	Dr. Stokes, Highbury	Aug.	—	Married	None	Ligature, both ovaries	13	5	Recovered	Died 1880. Phthisis.
958	Dr. Aitken, Netley	Aug.	26	Single	None	Ligature	15	5	Recovered	Well in 1881.
959	Mr. Pocklington, Wimbledon	Aug.-Sept.	44	Widow	Omental	Ligature	32	5	Recovered	Well in 1880.
960	Dr. Liddon, Taunton	Sept.	44	Widow	Parietal, omental and intestinal	Ligature	7	5	Recovered	Well in 1881.
961	Dr. —, Barbadoes	Sept.	86	Married	None	Ligature	18	5	Recovered	
962	Dr. Macconchy, Downpatrick	Sept.	48	Single	Intestinal	Ligature, both ovaries	19	5	Recovered	
963	Dr. Bezey Thorne	Oct.	63	Widow	Omental	Ligature	7	8	Recovered	
964	Dr. Well, Basle	Oct.	55	Married	None	Ligature	10	5	Recovered	Well in 1881.
965	Dr. Blaxall	Oct.	59	Married	None	Ligature	13	5	Recovered	Well in 1880.
966	Dr. Parson, San Francisco	Oct.	39	Single	None. Dermoid	Ligature	...	...	Recovered	Well in 1881.



No.	Medical attendant.	Date of operation.	Age.	Condition.	Adhesions.	Treatment of Pelvic.	Weight of tumour.	Length of incision.	Result.	Subsequent history or cause of death.
967	Mr. James, Uxbridge	1879	26	Single	None	Ligature	Pounds.	Inches.		
968	Dr. G. Anderson	Oct.	50	Single	None. Burst cyst.	Ligature	...	5	Recovered	Well in 1881.
969	Dr. Wilberforce Smith	Nov.	16	Single	None	Ligature	...	5	Recovered	Well in 1881.
970	Mr. Square, Plymouth	Nov.	34	Single	None	Ligature	...	4	Recovered	Well in 1881.
971	Mr. Douglas, Hounslow	Nov.	19	Single	Parietal, omental and pelvic	Ligature	25	6	Recovered	Well in 1881.
972	Mr. Archibald, Brixton	Dec.	—	Widow	Omental	Ligature	9	4	Recovered	Well in 1881.
973	Dr. Sheehy	Dec.	50	Married	None	Ligature	15	5	Recovered	Well in 1881.
974	Mr. Lund, Manchester	Dec.	34	Married	None	Ligature	10	4	Recovered	Well in 1881.
975	Mr. T. Murray, Brighton	Dec. 1880	65	Married	None	Ligature	17	5	Died, 6th day	Septicæmia.
976	Mr. Bubb, Cheltenham	Jan.	68	Single	Parietal and omental.	Ligature	22	5	Recovered	Well in 1881.
977	Dr. Broxholm	Jan.	54	Married	Suppurating cyst Parietal, omental and pelvic	Ligature, both ovaries	...	5	Recovered	Died Aug., 1880. Cancer of uterus.
978	Dr. W. Roberts Manchester	Jan.	68	Single	None	Ligature	24	5	Died, 6th day	
979	Dr. Risdon Bennett	Jan.	30	Single	None	Ligature	7 ovarian; 2 uterine fi.	5	Recovered	Well in 1881.
980	Mr. Haffenden	Feb.	49	Married	None. Burst colloid	Ligature	50	5	Recovered	Remains well.
981	Mr. Dodd, Slough	Feb.	58	Single	Parietal and intestinal.	Ligature	16	5	Recovered	Remains well in 1881.
982	Mr. Robey, Wandsworth	Feb.	55	Married	Parietal and omental	Ligature	22	5	Recovered	Well in 1881.
983	Dr. Reed, Manchester	March	37	Married	Intestinal. Burst cyst	Ligature	11	5	Recovered	Remains well.
984	Dr. Priestley	March	32	Married	None	Ligature	6	5	Recovered	Remains well.
985	Dr. Priestley	March	30	Married	None. Burst cyst.	Ligature	14	4	Recovered	Child June, 1881. Remains well.

986	Dr. England, Winchester	March	58	Married	Intestinal and mesenteric. Cancer	Ligature	7	5	Died, 21 hrs.	Embolism.
987	Dr. Priestley	March	53	Married	Pelvic	Ligature	5	5	Died, 24 hrs.	Embolism.
988	Dr. Pén, Paris	March	45	Married	Parietal and omental	No pedicle	19	5	Recovered	Remains well in 1881.
989	Dr. MacSwiney, Dublin	April	35	Married	Parietal and omental	Ligature	21	5	Recovered	Remains well in 1881. Thrombosis of carriages since operation; now pregnant.
990	Mr. Harper, Holbeach	April	49	Married	None	Ligature	31	5	Recovered	Remains well in 1881.
991	Mr. Townshend	April	—	Single	Parietal and intestinal. Burst cyst	Ligature, both ovaries	...	5	Died, 3rd day	Septicæmia.
992	Mr. Pocklington, Wimbledon	May	61	Married	Parietal and omental	Ligature	40	5	Recovered	Remains well.
993	Dr. Garrett Anderson	May	63	Single	Omental	Ligature	17	5	Recovered	Remains well in 1881.
994	Mr. Frost, Williton	May	49	Married	Omental and intestinal	Ligature	15	5	Died, 19th day	Intestinal obstruction.
995	Mr. W. Adams	May	62	Widow	None	Ligature	20	5	Recovered	Remains well in 1881.
996	Mr. Bubb, Cheltenham	May	29	Single	Omental, intestinal and pelvic	Ligature, both ovaries	...	5	Recovered	Remains well in 1881.
997	Dr. Stephens, Brighton	May	52	Married	Omental and intestinal	Ligature	20	5	Recovered	Remains well in 1881.
998	Mr. Clifton	May	35	Married	Parietal and omental	Ligature	17	5	Recovered	Remains well in 1881.
999	Dr. Whitehead, Manchester	June	46	Widow	Omental and pelvic	Ligature	12	5	Recovered	Remains well.
1000	Dr. Priestley	June	42	Married	Omental and caecal	Ligature	12	5	Recovered	Remains well in 1881.

This table is corrected up to the 16th of September, 1881.



FURTHER OBSERVATIONS  
ON THE VALUE OF  
STETHOMETRY IN THE PROGNOSIS OF  
CHEST DISEASE.

BY  
ARTHUR RANSOME, M.D., M.A.

(COMMUNICATED BY DR. W. H. BROADBENT.)

---

(Received January 14th—Read January 25th, 1881.)

---

EIGHT years ago, in a paper "On the Respiratory Movements in Man," I had the honour of laying before the Society an account of a new instrument for measuring the movements of the chest wall. And amongst the applications of this instrument I ventured to suggest the probability that its indications would be of service in the prognosis of chest disease.

Three years later, in a treatise on 'Stethometry,' I again called the attention of the profession to the importance of recording the exact extent of the respiratory movements, in forced breathing, in cases of diseases of the lungs, and I was able to speak somewhat more definitely of the value of such records as an aid to prognosis. It was then shown to be probable that in several diseases of the respiratory organs, notably in emphysema, and in complaints compli-

cated with emphysema, such as some forms of asthma and chronic bronchitis, "the degree of diminution of the motions of the chest wall is a direct measure of the extent to which the disease has advanced."

In pleurisy it was found that stethometry shows the violence of the attack by the degree of immobility of the ribs over the part affected, and it marks the progress towards cure. After the absorption of effusion also the records of measurement often indicate the tendency to return to a healthy standard of movement, and "foretell to some extent the degree of injury done to the system."

It was further remarked that the forward and lateral movements of the ribs, in this disease, are probably of chief value as guides to our judgment under this head.

In phthisis there was not found to be any such simple relation between the extent of motion and the gravity of the disease, yet it was thought probable that much assistance in prognosis might be had in this complaint by observing—1st, the relative extent of the forward and upward movements of the ribs; 2nd, the degree of freedom of motion enjoyed by ribs placed over the site of a vomica; and 3rd, by evidence of compensatory increase of movement in portions of the thorax not immediately over the seat of disease.

I do not now propose to add anything to what was then said respecting diseases of the chest other than phthisis, but it is probable that in the difficult questions that constantly arise respecting this last-named complaint, my further experience of chest measurement may be of some little service.

Two advantages have arisen from the longer period over which the observations now extend—1st, increased facility in using the instrument of measurement, the three-plane stethometer, and increased confidence in its power of giving accurate results when due precautions are observed; and 2nd, an opportunity of ascertaining the issues of most of the cases from which my conclusions have been drawn.

I will not now describe the method of applying the stethometer, as I have already had the honour of bringing it before the notice of the Society, and I can therefore refer those interested in the subject to the paper on "Respiratory Movements in Man," published in the 'Transactions' of the Society for the year 1873. I may remark, however, that I have found the precautions against error (enumerated at p. 67, vol. lvi) usually quite sufficient to prevent any serious misstatement of the degree of movement of the chest wall.

In a paper like the present one the most important advantage gained by longer experience, is the power of obtaining the after-life history of the cases observed, and consequently the verification or otherwise of the prognosis of the case. In other words, it has become possible to rank the several patients as belonging to an acute or a chronic group.

At the date of the publication of the work on 'Stethometry,' the stethometer had only been in use about five years. In many cases, therefore, it was at that time necessary to draw conclusions rather from the past history of the patients than from the actual results of the disorder. Since then, however, I have continued to take careful notes of this class of disease, and, owing to the fact that a large proportion of the cases have been attended in private practice, or in consultation with other medical men, it has been possible to watch their subsequent progress.

The number of observations from which I can select examples is still somewhat limited, but the results of the illness can be given more frequently than is usually the case in out-door hospital practice.

It will be found also that a large number of the cases that I have recorded are chronic in their character, a circumstance that much facilitates the comparison that has to be drawn, between the relative extent of chest movement in chronic and acute cases.

The comparatively large proportion of chronic cases in the series I have to lay before you is probably due to the

nature of the social grade from which the examples are chiefly drawn, and to the favourable character of the locality in which most of these persons live.<sup>1</sup>

In a suburban practice near Manchester most of the patients belong to the upper middle class. Many of them live in fair-sized, well-ventilated, well-drained houses. They are able to obtain a sufficiency of good food, and can have all needful comforts in time of sickness. In Bowdon also some of the cases in which disease has been arrested have been imported into the place owing to the reputation that it enjoys of being favourable to recovery from chest complaints.<sup>1</sup>

In several instances of long after-life I have had to rely for the diagnosis of the disease upon the testimony of eminent physicians, such as Sir T. Watson, Sir James Clarke, Dr. C. J. B. Williams, and Dr. Symonds, of Clifton, and I may also mention that in most of the chronic cases my own diagnosis has been confirmed by other physicians.

There is, however, no lack of acute cases in the neighbourhood of Bowdon, especially in the lower town and in the clay lands that surround the sandy mounds, but there are several impediments in the way of using the stethometric registers of such cases. Thus, it is necessary in all cases to obtain the measurements in an interval of comparative quiescence. It is almost impossible to base a prognosis accurately upon measurements obtained during a period of active deposit in the lungs. Even chronic

<sup>1</sup> It is certainly remarkable how well most cases of phthisis progress in Bowdon and its neighbourhood. The fact accords well with the observations of Drs. Bowditch and Buchanan on the influence of a well-drained and porous soil on the distribution of this disease.

Bowdon, and parts of Dunham and Altrincham, are built upon a thick bed of sand, in many places over 100 feet in thickness. The climate is thus rendered more temperate and the air and soil drier. After the wettest weather the paths speedily become dry, and the basement story of a house is often as dry as its attic. It has the further advantage that it is virgin soil. The sand is as pure and free from organic matter as in the days when it was deposited by ice floes, or was silted up by the estuary of the Mersey. No house is ever built upon freshly-made ground, or on pits that have been filled up with refuse.

cases in this stage necessarily give greatly diminished movements, and thus the presence of active inflammation accompanied by fever, as ascertained by the thermometer, has always been a bar to the use of the stethometer in this regard.

It is therefore necessary to wait for a remission in the complaint, and as these periods of inactivity are less frequent and shorter in acute forms of phthisis, the measurements in this class of the disease have been less frequently recorded, and it has been necessary to exclude most cases of acute tuberculosis altogether.

In many of the acute cases also, as they belonged to a lower and more migratory class of persons, it has been difficult or impossible to ascertain the final issue, and thus many observations have been lost. This is especially the case with respect to the class of domestic servants.

Some forms of phthisis complicated and ushered in by pleurisy have also been kept out of the tables, as the mechanical effects of the extensive adhesions perturb the purely morbid influences, and prevent conclusions from being drawn from the numerical records of the chest movements.

Having made these preliminary remarks, I proceed now to lay before you two series of measurements: the one of the movements of the clavicles about their middle point, and of the anterior ends of the third ribs in chronic cases of phthisis; the other, of similar observations in acute forms of the disease; and, in order that they may be the more accurately compared, I have further divided each series into male and female cases.

There are thus twenty-five cases of chronic phthisis amongst males (Table 1), and the same number amongst females (Table 3); and, of the acute cases, there are twenty of each sex (Tables 2 and 4). In addition to these groups of measurements, I also append one in the form of a chart (No. 5) of the chest movements of certain cases, twelve in number, that I regard as exceptional. These are cases possessing much freedom of chest movement,



which yet terminated fatally at an early period. They will have to be examined in detail presently.

With the exceptions now noted, the tables contain nearly all the completed observations bearing upon the subject of which I have a record, *i.e.* all relating to patients in whom the disease pursued either an obviously acute or chronic course; only those cases are omitted that were not remarkable for either extent of movement, or length, or shortness of duration—ordinary average cases from which nothing definite could be learnt in the direction in which we are now seeking for information. I believe, therefore, that with the above exceptions the series is a fairly representative one.

The better to display to the eye the extent of motion in each group, I have drawn, on the accompanying charts, the actual dimensions of each measurement in tenths of an inch. The figures with diagonal lines in the middle of each diagram show the extent of the forward movements of the clavicles, and of the third ribs on the two sides of the chest, the black figures on each side of the diagram the corresponding extent of these movements in the upward direction, the upper parts in each case thus relating to the motions of the mid-portions of the clavicles, the lower parts giving the movements of the ends of the third ribs.<sup>1</sup>

In each case, the measurements on the most diseased side are placed to the left of the middle line of the table, and an attempt has been made to arrange the cases in the order of the extent of motion, those with the least dimensions being placed at the top of each series.

By this method it is possible to see at a glance the comparative extent of movement on each side, and to compare the cases one with another. A brief description of the nature of the disease in each patient is placed over

<sup>1</sup> In many instances, especially amongst males, I had noted also the movements of the sternum and of the ends of the fifth ribs, but these have been omitted in order to secure uniformity in the diagrams, and in a few cases I am only able to give the movements of the third ribs.

the representation of the degree of movement of the chest wall.

An average chest register from healthy persons is appended to Charts 3 and 4 to serve as a basis of comparison.

So far as these observations now extend, I think they fully justify my estimate of the value of stethometry as an aid to prognosis in phthisis. The peculiarities of movement in the acute and chronic cases respectively are just as strongly marked in this second, more extended series of cases, as in the more limited tables that I was able to give five years ago.

1. *General diminution of movement respectively in chronic and acute cases.*

It is impossible to survey the four diagrams representing the chest registers of the two series of acute and chronic cases without being at once struck by the smaller extent of motion enjoyed by the former group.

(a) Minimum movements. In four cases amongst the females having a short duration of life (Table 4)\* no movement whatever could be detected over the seat of disease in one or another of the dimensions of motion, in the *forward* direction in Cases 1 and 2, in the *upward* direction over the third rib in No. 3, and over the right clavicle in No. 4.

Amongst males no upward movement of the right clavicle could be found in Case 1, and the forward motion of this part was hardly perceptible in Case 3.

No such immobility of any part of the chest wall is to be found amongst the chronic cases.

(b) General dimensions of the forward movement. In the *forward* direction amongst the acute cases there is always a very great diminution of motion at one or other of the points selected for examination.

Amongst males only in one case (Table 2, No. 19) does the minimum reading of one or other part exceed

\* The peculiarities of movement are best seen in the charts, in which the reference numbers of the cases are the same as those in the first four Tables.

·20 of an inch, and in many cases it sinks to ·15 to ·10 or even, as we have seen, to zero.

Amongst females affected with acute disease it exceeds the limit of ·20 in three cases (Table 4, Nos. 17, 18, and 19), but the maximum (in Case 18) only attains to ·30 of an inch.

On the other hand, amongst the chronic cases, both male and female, such low readings are rare: ·10 occurring only twice (Table 2, Nos. 2 and 6), and between ·10 and ·15 only four times amongst males and three times amongst females.

In twenty-six out of the fifty cases it exceeds 0·20 of an inch. It is further noticeable that in all cases where the minimum reading is reached, it is over the less movable bone (the clavicle) that it is found.

The average dimensions of this movement of the clavicle on the worst side is 0·15 inch in acute cases, and ·29, or nearly double that amount, in chronic cases.

The forward movement of the third rib in chronic cases only once sinks below 0·20 (Table 2, No. 3), and the average forward push of this bone in this series is 0·54 inch, whilst in the acute series it is only 0·25 inch.

It is possible, therefore, at once to affirm that a small extent of forward movement, especially of the third ribs, is of evil augury, and that when the record of the latter bones falls short of 0·35 inch there is reason to foretell a rapid course of the disease.

On the other hand, if we may judge from the first four tables only, a large amount of power of respiratory movement gives promise of a longer duration of life.

(c) General dimensions of the upward movement.—A similar contrast may be remarked in the extent of the *upward* movements in chronic and acute cases respectively.

In the chronic male cases (Table 1) the average upward movement of the *clavicles* on both sides is 0·50 of an inch, and amongst females (Table 3) the mean readings are 0·56 on the worse and 0·66 on the better side.

The corresponding measurements in the male acute

cases (Table 2) are 0·25 on the worse and 0·39 on the better side.

Amongst females (Table 4) they are respectively 0·26 and 0·38.

The third ribs show a similar lack of power of upward movement in the acute cases. On the worst side amongst males the mean upward reading is 0·36, and amongst females it is 0·38; and even on the less diseased side the the numbers are: for males 0·45, and for females 0·51.

In the chronic group the mean upward rise on the worst side in males is 0·72, and in females 0·78; and on the better side the average readings are: for males 0·74, for females 0·85.

We may thus say broadly that the chronic cases have double the amount of movement that the acute cases have, both in the forward and in the upward directions of motion of the bones in question, and that in most instances patients may be provisionally grouped accordingly.

It is interesting to notice that in both series of patients, the average reading is the greatest amongst females in both the forward and upward movements, and this remark applies not only to the clavicle, which might be supposed to be the more movable bone in females, but also to the third ribs on both sides of the chest.

I apprehend that an explanation of this fact must be found in the much greater elasticity of the thoracic bones in females than in males, and it tallies with the observation presently to be noted, that in the young the active deposition of tubercle may proceed to a considerable extent, without greatly affecting the mobility of the chest wall.

Before proceeding further to discuss other peculiarities of chest movement to be found in the tables, it will be needful to note at once certain apparently exceptional results, that lie in the way of applying the simple test of measurement to any given essay at prognosis.

1. It will be observed that in the upper and lower por-

tions of the charts there is a tendency to an overlapping of the records of the two series of cases, especially amongst the male patients. The best of the acute cases (*i. e.* the last three or four of Chart 2) equal or exceed in their movements the worst of the chronic patients, *i. e.* the few first registers of Chart 1.

If this circumstance arose from a gradual improvement in the acute cases, and a shorter duration of the earlier chronic cases, this occurrence would not trouble us much, as it would only apply to the extremes of each class of cases; but, as we shall see presently, there is no such graduation of longevity. It will be found, however, that much of the anomaly disappears when the respective ages of the patients is taken into account. Age, as well as disease, undoubtedly exerts an important influence in impeding respiratory movements, and, in the first four cases of Chart 1, it has certainly had a restraining effect. All of these patients were over forty years of age, and at this time of life the solidification of the bones and cartilages already, even in healthy people, diminishes the extent of movement of the ribs, especially in the forward direction.

All the last four cases of the male acute series were under forty; two of them were under twenty; and the two others were not of a severely acute type.

Amongst the female cases only four overlap to an appreciable extent—the first three of Chart 3 and the last of Chart 4. One of the chronic cases was over fifty years of age, and another was the subject of pneumothorax, and the last two of the acute cases were also not of very short duration.

Closely connected with the preceding possible source of difficulty, we have the circumstances already mentioned, that there is also no definite relation between the duration of the case and the extent of the respiratory movement, and that there is no possibility of ranking the patient in the order of length of days according to the freedom of his chest movements.

This fact is, however, not of any great consequence.

Owing to the complication of the conditions of the several cases, it is of course essential that careful heed be taken to all the circumstances, and especially as regards stethometry, to the influences likely to affect the vigour and freedom of the chest movements. Each case will have to be judged upon its own merits. The art of prognosis cannot be turned into a simple mechanical problem; there will always be ample scope for the sagacity of the well-trained physician.

2. A much more important hindrance to right judgment in prognosis from chest measurement will be found in the list of exceptional cases grouped together in Chart 5. I am bound to show that about these cases there are truly exceptional circumstances, circumstances that can be recognised at the outset as likely to interfere with our results, otherwise these cases will very much disturb our confidence in chest measurements as an aid to prognosis.

I venture to think that in most, if not in all the cases of Chart 5, we can account for their deviation from the general rule thus far observed, that freedom of respiratory movement accompanies chronicity of disease.

It will be perceived that all the cases in Chart 5 display a considerable extent of chest movement, and yet they were probably none of them long lived. How is this anomaly to be accounted for? The most important point observable in the first nine of the cases is their youthfulness.

It is remarkable how large, in the healthy state, are the dimensions of the chest-movements in childhood and in youth before the bones have lost their elasticity; and in *disease*, "even when the morbid action is both extensive and rapid in its progress, the chest walls often seem to retain their great elasticity." This fact, along with the greater danger in early life of tubercular deposits in other organs, may well make us cautious in pronouncing an opinion as to the future of youthful sufferers from consumption.

The first nine cases of Chart 5 are all under twenty

years of age, and the two aged twenty (Nos. 6 and 7) were remarkable for their juvenile appearance and stunted growth. The freest movements are those of the two boys, aged respectively eleven and fifteen years (Nos. 8 and 9), and the girl (No. 1), aged sixteen and a half years; and, although the result was not definitely ascertained in the two boys, the physical signs showed that the disease was very extensive and serious.

It is true that even in youth the movements may sometimes be much impaired, as in cases 10 and 17 in Table 2 (acute cases, males), and when this fact is noticed we may, with much probability, give an unfavorable prognosis; but in any patient under twenty years of age, my experience would make me hesitate to draw a favorable augury from even an extensive play of chest movement.

Again, it is certain that, even in adult life, we may have our judgment falsified by accidental circumstances, such as the occurrence of hæmorrhage, or the supervention of acute tuberculosis, or albuminuria.

Two of the remaining patients in Table 5 died of hæmorrhage or its consequences, and the third was the subject of constitutional syphilis.

I consider, therefore, that this list, though it gives an emphasis to the cautious expression of our opinion, yet takes away but little from the value of the other tables.

## 2. *Peculiarities of chest movement in chronic and acute cases.*

We are not left simply to the general magnitude of the respiratory motions as our sole guide to prognosis from stethometry. We have also the evidence to be derived from peculiarities in the behaviour of the bones situated over or in the neighbourhood of the seat of disease.

For successful prophecy as to the future of a case of phthisis, in addition to an accurate knowledge of the extent of the disease and of its rate of progress, we need some indication of the amount to which it taxes the vital

resources, and, if possible, some measure of its gravity as estimated by the system itself.

The influence of disease upon the system may often be made less obvious owing to the natural vivacity and hopefulness of the patient, and very frequently those whose frames most resent the injury, and in whom it makes the most rapid progress, are the very persons to make light of the ailment and to show a cheerful countenance during its attacks.

It would certainly be no small gain to us, if we could have the evidence of an automatic apparatus, independent of the emotions and of the will, to show the estimate taken by the nervous system of the degree of danger likely to assail the patient.

I think that we may find this evidence in the behaviour of the muscles of respiration placed near or over the seat of disease.

The very fact, just noticed, that the movement records cannot be directly connected with the extent of disease, might of itself permit us to hope that they really tell us something respecting the constitutional vigour of the patient, and of the comparative safety with which the movements may be carried on. And the probability of this surmise becomes much strengthened by a consideration of other similar morbid processes. Thus, in diseases of the joints, we know that an early sign of mischief is pain in the nerves and rigidity of the muscles, or some other effort made to preserve the immobility of the part, an effort often directly proportioned to the gravity of the disorder. Mr. Hilton, in his admirable lectures on "Rest and Pain," points out that there is a special arrangement of the nerves supplying the joints and muscles, in order apparently to secure rest to the injured part.

But Mr. Hilton is also able to show that the same anatomical law of distribution holds good with regard to the pleura, for he says (p. 256, ed. 1880):—"The same intercostal nerves which supply the intercostal muscles moving the ribs, supply also the serous membrane lining



the thoracic parietes and the skin over those different but physiologically associated structures, in order to produce harmonious and concerted action during the varied states of respiration. Here, then, we have the pleura representing the synovial membrane; the intercostal muscles representing the muscular apparatus connected with and moving a joint; and the cutaneous branches of the nerves spread over the intercostal muscles, assimilated in their arrangement to the cutaneous branches which supply the skin over the insertions of the muscles moving the joint." He then goes on to ask the question (p. 259):—"May not the irritation of an inflamed pleura bring on a contracted condition of the muscles between the ribs (intercostals), and thus engender *the limited breathing* and painful cramps and 'stitches,' from which such patients suffer, in addition to that which results directly from any local inflammation of the pleura, and which induces pleuritic patients to limit their respiration as far as possible to the action of the diaphragm? This spasmodic contraction of the intercostal muscles, induced by the inflammatory condition of the pleura, is precisely analogous to what we see in joint disease."

These deductions seem to me to be perfectly correct, but what is of almost more importance for our present object is the probability that the converse of Mr. Hilton's proposition is also true, and that when the contraction of the muscles over a diseased lung is relaxed, and the rib is again allowed to move more freely we may infer a cessation of the activity of the disease, and may pronounce a more hopeful prognosis than could have been given had the ribs remained immovable or, at least, much restrained in their action.

This observation, again, is greatly increased in value when we recognise the fact that the ribs have each, to a certain extent, a power of individual action. This point is worthy of a little closer examination.

*Independent rib movements.*—In the course of observations on the respiratory movements, I very early noticed

the fact that even in health there is no essential relation between the motions of the several parts composing the framework of the thorax, and that the range of movement of the ribs, in two directions at least (*i. e.* forwards and upwards), is under the control of the intrinsic muscles of respiration, which can, upon occasion, be made to act in obedience to the will.

In ordinary healthy but forced breathing it has thus been shown to be possible voluntarily to commence the inspiratory or expiratory act at the upper or lower regions of the chest, and also so to control the movements of the ribs as to produce an excess of either upward or forward motion.<sup>1</sup>

In disease, still more marked variations of movement may take place unconsciously, not in regions, but in more limited parts of the chest; and these variations, as we have seen, often give important information as to the condition of the underlying lung.

It appears, also, that other observers have come to the same conclusion.

Andral (in his 'Clinique Medicale,' tome iv, Paris, 1804) shows that the ribs possess a certain power of individual action, that each rib can, within certain limits, move independently of its neighbours, and that they have not merely a common movement. This observation was confirmed, and its bearing thoroughly discussed by Mr. Hutchinson in his article on the Thorax in the 'Cyclopædia of Anatomy and Physiology.' Thus, speaking of pathological respiratory movements, he says:

"The twelve intercostal muscles move in every combination, as if to meet impending difficulties, tenacious of life, and yielding only by compulsion to the advance of disease. Throughout the long list of diseases which attack men, these instinctive movements have to contend, shifting about, or growing less and less. . . .

"But, again, there are reasons for thinking that these

<sup>1</sup> A stethogram of this occurrence is given in my work on 'Stethometry,' p. 107, fig. 39.

movements may be changed from other causes not so purely physical; because sometimes no dyspnoea is to be perceived, and yet the movements are deranged, or they may change backwards and forwards, as if aërating specific portions of the lungs, *acting as a curative remedy to some incipient form of lung disease.*

*"Of limited breathing movement.*—The mobility of parts when disease attacks the chest may be surprisingly drawn forth. . . . It is not uncommon in phthisical patients to see strong and well-marked respiration kept up by the first, second, and third ribs, or by the tenth, eleventh, and twelfth. These ribs are movable, but it requires disease to bring their mobility forth. We are satisfied that there is a latent respiratory mobility during health, which is manifested only in disease."

These observations of Mr. Hutchinson, made independently of instrumental measurements, are abundantly corroborated by my tables, and I may further note that, as a consequence of the individual action of the ribs, certain variations of mobility of the chest wall are to be observed, not only over the ribs themselves, but at times also in the breast bone and clavicle.

One of the most remarkable features in the chest registers of phthisical patients is, indeed, the occasional predominance of the movement of the clavicle over that of the third rib. (The occurrence is to be noticed in Case 13, Table 1; Cases 5, 7, 9, and 30, Table 2; Case 18, Table 3; and in Cases 3, 14, 16, 17, 18, and 19, Table 4. It is thus much more common in acute than in chronic cases, and in females than in males.)

To any one who had not watched and measured these movements it would appear impossible that one or other of the third ribs could have its mobility impaired by adhesions and by other causes, and yet that the upper part of the sternum could be carried forward to such an extent, as to permit of the clavicle being pushed forward to the limit of 0.2, or even (as in Case 20, Table 2) of 0.4 inch in advance of the third rib on the same side.

It may be remarked that there is a possible source of error in this observation, in that the shoulders may have been instrumental in tilting forwards the clavicles during forced efforts at inspiration, but precautions were especially taken against this contingency, and although I cannot deny the possibility of its occurrence in some instances, I feel convinced from repeated trials, that the excess of clavicle action over that of the third rib is possible without any other than ordinary forced respiratory movements.

The flexibility of the costal cartilages during life is such that the movements of the sternum bear no constant relation to the movements of the ribs. The anterior ends of certain of these bones may move, or may be prevented from moving, without greatly affecting the raising or pushing action of the other ribs. Each rib uses to a certain limited extent its power of independent movement, and thus overcomes the resistance offered by the bones, whose motion is checked by adhesions or by some other less mechanical impediment.

It will be readily perceived what an important bearing these remarks have upon the question of prognosis, especially when they are taken in conjunction with Mr. Hilton's observations on the restraint exercised by disease upon the different sets of intercostal muscles.

It becomes not only possible, but highly probable, that measurements showing local limitation of motion or increased freedom of movement will have a distinct prognostic significance, and that exact records of the extent of these variations will give important assistance in determining the probable future of many cases of phthisis. In illustration of this remark I desire to direct attention especially to two points :

1. To the action of portions of the chest wall over the site of a vomica.
2. To the demonstration of excessive motions, in the forward and upward direction, in some parts, to

compensate for the loss of power of movement in others.

1. *Chest movements over the site of a vomica.*—One of the most striking differences between the two series of cases, whose stethometric registers appear on the diagrams, is to be found in the respective behaviour of the upper bones of the chest over the site of a chronic cavity or over a rapidly softening deposit of tubercle. The freedom of movement over the one, and the absence of movement or its impairment over the other, are usually very distinct, and often enable us to judge from this sign alone to which class any given patient belongs.

This statement will be found to be borne out by an analysis of the two sets of tables now before us.

In order to determine the question I have extracted from the four tables all the cases in which the third stage of the disease had been reached.

Naturally the largest proportion of such cases is to be found in the acute series. Of these latter patients 21, 9 females and 12 males, had arrived at this stage. Whilst of the chronic group only 12 are to be found with signs of a cavity, viz. 4 females and 8 males. The numbers are small but they are sufficient to display the contrast between their respective measurements.

The mean reading of the forward push of the clavicles amongst the acute series was only 0·14 in. amongst males, and 0·15 in. amongst females; and in only two of the patients (No. 20, males, and No. 18, females) was the forward push of this bone more than 0·25 in.

Amongst the chronic cases, the average forward push of the clavicle was more than double that of the acute set, namely, 0·31 for both males and females, and in only two cases (Nos. 1 and 3, males) was this dimension less than 0·20 in. of movement.<sup>1</sup>

<sup>1</sup> It is important to observe that this freedom of movement of the bones over a quiescent vomica does not invalidate the correctness of the observation that it is a favourable sign when these bones collapse somewhat and permit

It is noteworthy also that in half of the chronic cases, four males (Table 1, Nos. 1, 4, 13, and 14) and two females (Table 3, Nos. 15 and 18) there is actually a larger extent of motion over the site of the vomica than on the less affected side.

This circumstance is not to be observed in any of the acute series.

The third ribs give less frequently the surface marks of an underlying cavity, but in chronic cases this bone also frequently shows considerable freedom of movement when a vomica extends downwards so far, or when the disease in the lung has proceeded to the third stage to this point before its progress has been arrested.

In acute cases the motion is much more restricted.

In Tables 2 and 4 (acute cases) there are fourteen cases in which the softening of previously consolidated lung has overpassed the limit of the third rib—ten males and four females—and the average motion forwards of the bone is only 0.165 inch.

Amongst the chronic cases (Tables 1 and 3) there are twelve thus situated, but the forward movement of the third rib averages 0.46 inch, nearly three times the extent of movement of the acute series; and in three cases, (Table 1, No. 13, and Table 3, Nos. 9 and 15) the motion of the third rib over the excavated lung exceeds that of the opposite side, and amounts on an average to 0.70 inch.

The explanation of these results is probably as follows:—When an acute third stage of phthisis has been reached, nature makes an effort to limit the mischief; barriers of exuded lymph are thrown out, adhesions are formed with surrounding structures, and finally, the movements of the chest wall are kept within the narrowest limits compatible with safety to life. In acute cases of phthisis, therefore, even in a lull of the disorder, the readings of measurements over the site of a vomica, or over a rapidly softening lung, are the smallest that are ever met with in chest

of a sinking of the chest wall at these points. In spite of this sinking the mobility of the bones is often very considerable.

disease. Conversely, when the cavity becomes lined with a pyogenic membrane, that gradually ceases its activity and begins to secrete muco-purulent matter in small quantities only, air is permitted to pass more freely into the lung beyond the diseased part, and the system gathers strength again, both generally and locally, in the muscles of respiration; in this case there is a return of elasticity to the lung, increased mobility in the bones overlying the site of the cavity, and increased readings of the stethometric register.

We may, therefore, with much probability give a favorable prognosis when in any adult case we find a dry or tolerably quiescent vomica with a considerable extent of movement in the bone overlying it, and this is especially the case when the forward motion of this bone is greater than that of corresponding parts on the opposite side of the chest.

2. *Compensatory movements.*—The next point to which I would direct attention is of an entirely different character from the simple release from bondage of parts situated, in chronic cases, over the site of a vomica. I refer to the efforts often made by some portions of the expiratory apparatus to compensate for the forced abstention of others.

It is a matter of common observation that attempts may be made by one portion of the organism to supplement the shortcomings of another that has been disabled by disease.

In chest disease, accordingly, we continually see abdominal breathing take the place of costal movement, and it is not unusual for one lung to encroach to the extent of several inches towards the opposite side when, after pneumothorax or after the absorption of fluid, the other lung remains compressed by adhesions, or after the contraction and healing of an abscess in the lung. But, besides this, the movement of the ribs may be exaggerated in one direction to make up for loss in another.

In selecting instances of such compensatory movements it has been assumed, in the following pages, that only

those records were of this nature, in which one or other of the dimensions of motion on one side were palpably in excess of those on the opposite, usually the more healthy side.

In cases in which both sides of the chest were diseased it has also been regarded as probable that the compensatory principle was at work, when the bones nearest to the disease are much restricted in movement, whilst their neighbours on the same side are obviously moving to an excessive extent.

In three instances also, Table 1 (14), Table 3 (3) and (23) an excessive forward movement of the clavicle, out of all proportion to the motion of the third rib, has been held to be an attempt at succour. In thus limiting the selection, it is of course possible that our list may be short of the truth, seeing that attempts at compensation may have been made by ribs which did not succeed in surpassing their neighbours, and yet did more work than they had done at first. But it is obvious that these attempts would not be easy to detect, and they could hardly be reckoned as efficient unless they did exceed the motions of the other neighbouring parts of the chest.

On the other hand, also, it is possible that some of the larger readings of the instrument may have been due, not to any special efforts at compensation, but to greater freedom from impediments underlying certain of the thoracic bones.

Even in this last-named case, however, I apprehend that such freedom from restraint would have to be regarded as a favourable sign, and thus our ultimate object of assisting in the classification of the case would not be imperilled.

The letter (c) is, in the diagrams, placed opposite to the dimension of movement thus assumed to be exaggerated and compensatory.

These compensatory efforts have, indeed, a favourable or an unfavourable significance when we are contemplating them with a view to prognosis; and, judging



from my own observations, they may almost be classed in the one or the other category, according as they take place in the forward or in the upward dimension of movement.

In my work on 'Stethometry,' attention is several times called to this kind of succouring action on the part of certain of the ribs, and it is there shown that in several diseases, and especially in pleurisy, there is usually an increased compensatory movement of the chest bones. The fact is well shown in the diagram, which will be found at p. 97 of my previous paper in vol. lvi of the 'Society's Transactions,' and in 'Stethometry,' p. 66, Fig. 22.

In this disease (pleurisy) it is always the upward rise that is exaggerated, in order to compensate for the loss of forward and lateral movement due to adhesions.

The extent of this compensatory upward motion, so far as it has any prognostic significance, augurs badly, as it shows that the adhesions are of a firm, unyielding character, and that they are likely to be permanent, and the subsequent history of the cases of which I have a record fully bears out this conclusion.

In phthisis there is more scope for a discriminating judgment. The compensatory movements are not so constant as they are in pleurisy, and they are more difficult to recognise, in consequence, perhaps, of the low standard of physical vigour in these patients.

They are also not confined to one dimension of the motion, but are to be found in exaggerations of both the upward and the forward readings of the instrument.

1. *Compensatory upward movements.*—An excessive upward rise of the bones in this disease must probably be looked upon either as an unfavourable sign, as in pleurisy, or else as only a measure of the muscular power that the patient can bring to bear upon the obstruction to healthy breathing. In the latter case, the extent of motion may be regarded as in some sort a measure of the degree of vital power possessed by the patient, and thus, when it is great it will rank, so far as it goes, as a favourable cir-

cumstance. It probably also indicates a certain power of resistance to the disease, but it tells us little or nothing of its gravity, or of the probable rapidity of its course.

These remarks will be found to be fully borne out by a careful study of the several chest registers contained in the tables.

As might have been anticipated, the majority of instances of exaggerated upward rise of the bones are to be found amongst the chronic cases. There are sixteen such cases in Tables 1 and 3—the male and female chronic patients;<sup>1</sup> but there are also six instances of increased upward readings amongst the acute group of cases,<sup>2</sup> and in most of them there was present a considerable extent of active mischief.<sup>3</sup>

It will be found that in these six acute cases there was a very small extent of forward motion, just as we usually find in cases of pleurisy; and, in the chronic series, the number of patients with exaggerated upward movements who have also limited forward dimensions is about equal to the number of those in whom this movement is comparatively free.

Compensatory upward movement cannot therefore be taken as a proof of slowness of advance of morbid action.

Moreover, in the fact that in the chronic group, the male cases supply the majority (in the proportion of nine to seven) of examples of this action, we may perhaps see a further proof of the hypothesis, that the extension of motion in the upward direction is due to the greater muscular vigour of the patients, rather than to simple chronicity of the complaint.

2. *Compensatory forward movements.*—The case is quite

<sup>1</sup> Table 1, Nos. 4, 6, 7, 9, 13, 15, 16, 18, and 22; in Table 3, Nos. 2, 3, 13, 14, 16, 18, and 20.

<sup>2</sup> In Table 2, males, Nos. 4, 7, and 15; in Table 4, females, Nos. 4, 15, and 19.

<sup>3</sup> Thus, free forward movements are found in five males, Nos. 4, 13, 15, 18, and 22, and three females, Nos. 13, 16, and 18; in all the others the forward push of the ribs is much restricted, and we may suppose that the large upward rise has been intended to overcome this obstruction to respiration.

different with excessive and presumably compensatory *forward* movements of the chest.

These expansive motions seem usually to be tolerated only when the disease in the underlying lung is quiescent, or is going through the process of cure, and they are rarely found in adults in rapidly advancing forms of lung disease.

Amongst the forty acute cases in Tables 2 and 4, there are only two (Cases 13 and 19, females), that show some faint indications of an excessive forward motion. In No. 13 it is observable in the third rib on the worst side of the chest; in No. 19 it shows in the clavicle on the least afflicted side. In both these cases also it is probable that the disease was quiescent at the time, on the side on which the increased motion was observed.

In the chronic group, on the other hand, there are no fewer than fifteen instances of some extension of the forward push of the ribs or of the clavicles, and in most of these instances the compensatory excess of motion was well marked. It is noteworthy, too, that in almost every case where the exaggerated motion is on the same side, the neighbouring bone immediately over the disease has a very slight extent of movement, thus making the compensatory effort more palpable.

The clavicles move forward freely in five cases: two males, Table 1 (Nos. 13 and 21), and three females, Table 3 (Nos. 3, 23 and 24).

The third ribs on one side or the other in ten cases, six males and four females (see Table 1, Nos. 1, 6, 13, 14, 15 and 20; Table 3, Nos. 9, 10, 16 and 19), show evident signs of exaggerated motion. In the forward motions of both ribs and clavicles, in chronic cases, there is thus not only a larger general movement than in acute cases, but the movements frequently become increased apparently in order to make good deficiencies in other parts of the breathing apparatus.<sup>1</sup>

<sup>1</sup> I have found this compensatory action not only in phthisis, but in other diseases, in which the action of certain parts of the chest has been interfered with; for example, in cancer, in aneurism, and in one case of accident.

We may then, I think, from the data before us, fairly claim the attempt at compensation on the part of portions of the chest wall, as a sign that the disease at the time of the observation is not making rapid progress, and we may conclude that, if other conditions are favourable, it gives promise of a longer duration of life.

*Repeated measurements.*—In many cases a more accurate prognosis may be made by repeating the stethometric measurements at intervals of a few weeks or months. If the readings remain stationary at a high figure, or if there is evidence of improvement, our favourable opinion is much strengthened; and, on the other hand, if the records diminish in magnitude, with more or less rapidity, we must give an unfavourable or at least a guarded prognosis. Very frequently we shall find that the physical signs accord closely with the chest register; but, even if they do not, our judgment will receive valuable assistance from the evidence of failing or of increasing strength.

It will not be necessary to give many examples of these assertions, but it may perhaps be useful to illustrate them by an example of each kind, and to note a few of the variations that have been observed.

Chart 6 gives the results of two measurements, each of six patients.

1. The first is simply a case of rapidly advancing phthisis in a young man, aged twenty-one, with disease on both sides, but pneumothorax on the left. This latter circumstance accounts for the small amount of movement of the third rib on that side, but it does not diminish the value of the proof given by the stethometer of failing vigour. He died six months after the last record was made.

2. Cases 2 and 3 show precisely the converse condition in a male and female subject. No. 2, a male, is still living, two years after the last register was taken, and has much improved, the disease being now quite quiescent. No. 3 died two years after the observation, but at the time it was made she was improving in general health. Her illness dated from eight years beforehand, when she

had been pronounced consumptive by the late Dr. Symonds, of Clifton.

3. In Case 4 I give an instance of increased "upward" movement, along with a diminished forward push. This has several times occurred in persons of much energy, but in whom the disease was making progress. I therefore regard this circumstance as merely a sign of a struggle with the increased difficulty met with in moving the bony levers, and not as any proof of improvement in the condition of the lung.

4. Case 5 displays the converse of the last-named observation. I have several times noticed that whilst there has been an increase in the forward movement as the case went on, there has been at the same time a very distinct diminution in the extent of the upward rise of the ribs. As this event has occurred in my observation chiefly amongst the chronic cases, I have usually taken it as a favourable sign, and have attributed it to the cessation of the need for an extraordinary effort at compensation.

5. Lastly, Case 6 shows a stationary condition of one side of the chest, with some increase both in the forward and upward movements in the other. This variation would also probably be a favourable sign of some improvement, if not of the lung, at any rate in the general condition of the patient.

The several tables present other interesting variations of movement.

Thus, there are some persons in whom the clavicles and third ribs both possess a small degree of movement; in others, both move with considerable freedom on the sounder side of the chest. Again, in a third class, the third ribs greatly exceed the clavicles in extent of movement both forward and upward. And, lastly, there are a few individuals in whom, upon the diseased side, the clavicles move rather more freely even than the third ribs.

These must, for the present, be referred to individual idiosyncrasies, but they may, on more extended observation, be found to possess prognostic significance.

In conclusion, let it not be supposed that stethometry can furnish an invariable rule, according to which acute and chronic cases can be at once recognised by the degree of respiratory movement that they possess.

Such a possibility is very far from my mind ; nevertheless, upon the whole, other things being equal, there is a distinct lessening of movement in rough proportion to the gravity of the disease ; and there are also certain other peculiarities about the chest movements in chronic cases that may serve as additional physical signs of a slow rate of progress, or even of an arrest of the disease.

In the difficult questions that continually arise with respect to the probable future of these cases, it appears to me that every "aid to prognosis," however slight, will be acceptable, especially to consultants in chest diseases.

Stethometry makes a claim only to be an adjunct to our ordinary methods of examining the chest. It is one of at least some importance, and I feel convinced that any physician who may be induced to employ the instrument of measurement steadily, and with due precautions, through a series of years, will find great help in its indications. He will get clearer views of the action of the respiratory machinery, his diagnosis by means of percussion and auscultation will be checked and extended by this additional physical sign, and, lastly, his power of prognosis will be augmented, both by a study of the automatic indications given by the muscles and nerves presiding over the respiratory act, and by the intelligence given by the instrument as to the vigour and muscular power of the patient.

TABLE 1.—*Phthisis. Chronic Cases (Males). Chest movements in tenths of an inch.*

No.	Page.	Initials.	Age.	Clavicles.			3rd ribs.				Duration in years. <sup>1</sup>		Remarks.	
				U.	F.	U.	U.	F.	U.	F.	Before.	After.		
1	00	J. W.	65	30	15	20	30	30	35	30	30	35	L. 5	Formerly vomica at apex, now no physical signs.
2	00	E. W.	48	15	10	15	15	60	35	50	65	5	L. 1½	(Right) deposit to 4 in.; (Left) healthy.
3	00	J. K.	40	25	18	23	45	50	17	52	55	5	...	(Left) large dry vomica to 4 in.; (Right) 2nd stage to 6 in.
4	00	A. G. S.	40	60	25	25	60	30	35	55	9	L. 10	(Right) formerly vomica at apex, now no physical signs.	
5	00	R. H.	31	50	12	30	40	95	40	52	120	2	L. 1½	(Left) 1st stage to 1½ in.; (Right) healthy.
6	00	J. W.	17	75	10	20	70	80	35	35	80	1	L. 8	(Left) 1st stage to 2 in.; (Right) healthy.
7	00	J. J.	35	20	15	27	40	70	35	50	65	2	D. 2	(Left) 2nd stage to 5 in.; (Right) 1st stage to 1½ in.
8	00	N. G.	26	...	...	...	45	40	60	65	6	D. 2	(Left) deposit to 6 in.; (Right) healthy.	
9	00	C. C.	57	60	20	25	60	70	35	55	65	10	L. 8	(Left) 2nd stage to 4 in.; (Right) healthy.
10	00	D. L.	26	40	25	40	50	65	38	50	95	3	...	(Right) dry vomica to 3 in.; (Left) deposit to 1½ in.
11	00	J. D.	42	50	20	25	60	100	50	60	100	4	...	(Right) 1st stage to 2 in.; (Left) incipient deposit.
12	00	G. S.	25	65	20	50	95	50	50	75	125	1	D. 3	(Left) 1st stage to 3 in.; (Right) healthy.
13	00	A. W. L.	54	40	50	50	42	50	40	68	60	2	L. 11	(Left) 1st stage to 1½ in.; (Right) consolidation to 4 in.; vomica at apex.
14	00	F. C.	25	50	20	40	40	80	75	60	75	7	D. 2	(Right) 1st stage to 2 in.; (Left) consolidation to 4 in.; vomica at apex.
15	00	J. G.	62	55	20	45	55	70	75	70	50	34	L. 2	(Left) formerly vomica, now no physical signs.
16	00	A. W.	29	50	15	50	25	60	70	100	60	4	D. 2	(Left) upper lobe, 2nd stage; (Right) healthy.
17	00	T. R.	36	50	30	50	60	110	65	70	100	3	L. 2	(Left) 2nd stage to 1½ in.; (Right) healthy.
18	00	F. A.	27	40	40	45	50	35	70	85	60	5	L. 5	(Left) consolidation of apex; (Right) healthy.
19	00	W. C.	38	50	20	20	50	70	90	95	65	5	L. 7	(Left) formerly consolidation, now no physical signs.
20	00	G. L.	48	40	25	30	40	100	100	75	90	9	L. 8	(Left) consolidation to 2 in.; (Right) incipient deposit at apex.
21	00	E. S.	17	80	55	80	90	90	60	80	100	1	L. 3	(Right) 1st stage at apex; (Left) healthy.
22	00	J. T.	18	60	65	85	80	80	65	110	70	3	L. 2	(Right) 2nd stage to 2 in.; (Left) deposit under clavicle.
23	00	J. P.	25	40	55	90	40	40	70	115	75	4	D. 4	(Left) deposit to 5 in., large cavity; (Right) upper lobe, 2nd stage.
24	00	T. G.	61	70	35	55	60	95	70	85	100	1	D. 10	(Right) 1st stage to 2 in.; (Left) healthy.
25	00	W. L.	27	80	50	75	100	100	95	110	120	2	L. 3	(Left) 1st stage to 2 in.; (Right) healthy.

The letter D. signifies that the patient died so many years after the examination : L. that he was still living at the date of this paper.

TABLE 2.—*Phthisis. Acute Cases (Males). Chest movements in tenths of an inch.*

No.	Page.	Initials.	Age.	Clavicles.						3rd ribs.						Remarks.
				U.	F.	U.	F.	U.	F.	U.	F.	U.	F.	U.	F.	
1	00	D. W.	49	15	6	10	...	30	11	16	10					4 months' duration; (Left) extensive deposit in 3rd stage; (Right) incipient disease; died a few months afterwards.
2	00	J. G.	27	40	10	15	40	55	13	25	50					3 months; (Left) 2nd stage to 3 in.; (Right) 3rd stage to 1½ in.; died 18 months after.
3	00	J. P.	21	10	3	20	30	35	20	40	50					4 months; (Right) 3rd stage to 4 in.; (Left) incipient deposit; result uncertain.
4	00	I. K.	28	40	10	16	40	55	13	25	50					8 months; (Left) 3rd stage to 4 in.; (Right) vomica at apex; died in 16 months.
5	00	E. S.	21	10	15	35	30	5	5	45	40					1 year; (Right) 3rd stage, pneumothorax; (Left) healthy; died 1 year after.
6	00	J. H.	34	...	...	...	...	30	15	25	50					1½ year; (Right) 2nd stage to 4 in.; (Left) deposit to 1½ in.; died 4 months after.
7	00	J. M.	25	45	25	35	30	38	23	15	30					1 year; (Left) large vomica; (Right) 2nd stage to 4 in.; died in 1 year.
8	00	J. C.	28	30	15	20	35	40	25	30	50					16 months; laryngitis; (Left) 3rd stage to 6 in.; (Right) 2nd stage to 2 in.; died in 1 year.
9	00	S. E.	22	20	25	55	40	10	15	45	40					1½ year; (Right) 3rd stage; (Left) 2nd stage to 4 in.; died in 6 months.
10	00	W. C.	19	20	15	15	10	20	28	35	30					1½ year; (Left) 2nd stage to 4 in.; (Right) vomica at apex; died in 1 week, suddenly.
11	00	C. J.	67	15	15	15	13	45	30	35	45					3 months; (Right) 2nd stage to 3 in.; (Left) healthy; died in 3 months.
12	00	H. S.	22	15	12	20	35	50	28	30	60					4 months; (Left) 2nd stage to 2 in.; (Right) healthy; died in 9 months.
13	00	J. S.	52	30	20	30	40	37	30	35	40					6 months; (Left) 2nd stage to 4 in.; (Right) deposit at apex; died in 6 months.
14	00	J. W.	48	15	10	15	15	60	20	50	70					1 year; (Left) deposit to 4 in.; (Right) incipient deposit; living 4 months after.
15	00	M. D.	36	15	10	15	20	50	30	20	30					1½ year; (Right) deposit to 1½ in.; (Left) to 6 in.; vomica at apex; died 1 year after.
16	00	D. L.	45	20	15	20	30	20	35	25	30					1 year; (Right) 3rd stage to 6 in.; (Left) 2nd to 2½ in.; died in 1 year.
17	00	W. C.	17	30	20	25	40	40	30	35	50					1½ year; (Left) 1st stage to 1½ in.; (Right) 2nd stage to 5 in.; vomica at apex; died a few months after.
18	00	C. D.	36	...	...	...	...	40	45	60	50					2 years; (Right) 3rd stage to 4 in.; (Left) 3rd stage to 3 in.; died in 2 months.
19	00	J. B.	30	50	30	45	60	70	35	50	70					(Left) 2nd stage to 5 in.; (Right) healthy; died in 18 months.
20	00	A. B.	19	40	35	45	50	10	10	50	50					1 year; (Right) consolidation vomica at apex; (Left) incipient deposit; died in a few months.



TABLE 3.—*Phthisis. Chronic Cases (Females). Chest movements in tenths of an inch.*

Page.	Initials.	Age.	Clavicles.				3rd ribs.				Duration in years.		Remarks.
			U.	F.	U.	F.	U.	F.	U.	F.	Before.	After.	
1 00	Mrs. J.	30	50	15	30	70	60	35	50	80	4	D. 1½	(Right) 2nd stage to 4 in.; (Left) healthy.
2 00	" E.	50	50	15	25	35	70	40	48	60	4	L. 10	(Right) 2nd stage to 2 in.; (Left) healthy.
3 00	" W.	25	80	15	43	80	130	30	45	120	8	L. 5	(Left) large vomica, pneumothorax; (Right) healthy.
4 00	" B.	32	45	18	37	54	60	40	67	80	3	D. 2	(Right) deposit to 5 in.; vomica under 3rd rib; (Left) incipient deposit.
5 00	" S.	34	50	18	30	68	70	50	65	95	5½	L. 1	(Right) 2nd stage to 2 in.; (Left) healthy.
6 00	" E.	27	30	28	25	50	50	30	50	55	2	D. 2	(Left) 3rd stage to 4 in.; (Right) incipient deposit.
7 00	F. J.	28	50	20	25	55	80	50	50	95	2½	D. 2	(Right) 1st stage to 3 in.; (Left) healthy; died of uterine hæmorrhage.
8 00	A. P.	30	30	20	25	50	80	33	60	80	1	L. 2	(Right) incipient deposit to 4 in.; (Left) healthy.
9 00	L. G.	35	60	25	30	60	75	35	35	75	2	L. 8	(Left) deposit to 3 in.; 2nd stage at apex; (Right) healthy.
10 00	Mrs. D.	30	40	20	25	25	55	45	40	55	1½	L. 6	(Left) 1st stage to 1½ in.; (Right) healthy.
11 00	S. W.	29	"	"	"	"	50	33	60	80	3	D. 2	(Left) large dry vomica; (Right) incipient deposit at apex.
12 00	G. S.	28	70	20	30	70	100	35	50	100	10	L. 5	(Right) consolidation of apex; (Left) healthy.
13 00	Mrs. S.	30	30	20	30	60	60	35	50	55	2	L. 8	(Right) consolidation to 3 in.; (Left) healthy.
14 00	F. M.	23	60	20	40	70	50	63	63	50	1½	D. 3	(Right) consolidation to 2 in.; (Left) healthy.
15 00	I. F.	20	30	30	40	38	70	70	55	60	8	D. 2	(Left) large dry vomica at back; (Right) 1st stage to 3 in.
16 00	Mrs. W.	27	30	30	50	80	80	70	60	80	4	D. 2	(Right) softening to 4 in.; (Left) incipient deposit to 1½ in.
17 00	" G.	29	30	25	35	65	80	50	50	95	1	L. 6	(Left) deposit to 2 in., 2nd stage; (Right) healthy.
18 00	J. F.	23	56	40	45	50	50	30	55	60	4	L. 1½	(Right) deposit to 2 in.; vomica at apex; (Left) healthy.
19 00	M. R.	23	70	30	58	90	100	75	60	100	2	L. 9	(Left) 1st stage to 2 in.; (Right) healthy.
20 00	S. J.	25	60	40	50	60	65	45	85	80	3	L. 5	(Left) 2nd stage to 6 in.; (Right) healthy.
21 00	S. K.	35	70	40	40	80	100	70	85	100	1	L. 5	(Left) incipient deposit to 2 in.; frequent hæmoptysis; (Right) healthy.
22 00	Mrs. J.	33	80	40	55	80	100	80	85	100	3	L. 7	(Right) deposit to 2 in., 2nd stage; (Left) healthy.
23 00	" S.	42	75	55	75	75	80	70	70	90	8	L. 1	(Right) consolidation of upper lobe; (Left) healthy.
24 00	R. C.	20	95	78	75	95	110	80	100	130	2	D. 2½	(Right) consolidation to 3 in.; (Left) healthy.
25 00	E. H.	36	120	50	60	120	130	63	85	135	1	L. 2	(Right) apex consolidated; (Left) healthy.

TABLE 4.—*Phthisis. Acute Cases (Females). Chest movements in tenths of an inch.*

No.	Page.	Initials.	Age.	Clavicles.				3rd ribs.				Duration.		Remarks.
				U.	F.	U.	F.	U.	F.	U.	F.	Before.	After.	
1	00	S. G.	30	5	...	5	10	...	...	...	...	Doubtful	D. in 3 weeks	(Left) extensive deposit; vomica at apex; (Right) 2nd stage to 6 in.
2	00	Mrs. R.	39	10	...	30	30	...	...	...	...	8 months	D. 6 mos.	(Right) 3rd stage to 6 in.; (Left) incipient deposit.
3	00	M. S.	20	3	7	30	...	...	...	...	...	1 year	D. 1 mo.	(Right) 2nd stage throughout; (Left) incipient deposit.
4	00	B. H.	24	5	10	10	20	35	20	25	20	Doubtful	D. 6 mos.	(Left) deposit to 6 in.; vomica at apex; (Right) apex, 2nd stage.
5	00	B. C.	26	30	12	15	40	30	11	20	45	Origin uncertain	D. 3 mos.	(Right) 2nd stage to 4 in.; (Left) 3rd stage to 2 in.
6	00	J. T.	25	23	10	15	50	50	16	20	55	18 mos.	D. 5 mos.	(Right) 3rd stage to 4 in.; consolidation to 3 in.
7	00	M. R.	25	20	12	15	45	25	15	35	40	8 months	D. 6 mos.	(Left) deposit to 5 in., 3rd stage (Right) 2nd stage to 2½ in.
8	00	M. H.	47	20	18	20	25	35	30	30	40	5 months	...	(Left) 2nd stage to 5 in.; (Right) 2nd stage to 3 in.; vomica at apex.
9	00	M. W.	33	20	12	30	20	20	30	35	35	Doubtful	D. 6 mos.	(Left) extensive deposit, 2nd stage; (Right) incipient deposit at apex.
10	00	M. R.	26	30	15	30	30	40	15	40	45	18 mos.	D. 6 mos.	(Right) 2nd stage to 4 in.; (Left) incipient deposit.
11	00	M. S.	45	25	10	35	60	50	30	75	80	3 months	D. 1 year	(Left) deposit to 3 in.; vomica under clavicle; (Right) healthy.
12	00	M. J.	38	28	15	25	40	50	25	35	60	2 years	D. 8 mos.	(Left) 2nd stage to 6 in.; (Right) incipient deposit at apex.
13	00	A. L.	36	30	15	30	60	70	40	35	85	1½ years	D. 6 mos.	(Left) deposit to 5 in., 2nd stage at apex; (Right) 2nd stage to 1 in.
14	00	E. J.	20	30	25	20	35	25	12	25	30	1½ years	Doubtful	(Left) deposit to 6 in., 3rd stage; (Right) 2nd stage to 4 in.; vomica at apex.
15	00	S. B.	25	60	20	25	50	60	30	50	65	2 months	D. 4 mos.	(Right) incipient deposit to 1 in.; (Left) 3rd stage at apex.
16	00	H. M.	20	30	25	45	50	30	17	40	50	5 months	D. 6 mos.	(Right) consolidation to 6 in.; vomica at apex; (Left) healthy.
17	00	C. H.	23	20	28	35	40	15	25	40	45	3 months	Doubtful	(Left) 2nd stage to 2 in.; (Right) healthy.
18	00	M. M.	29	30	35	45	35	40	30	45	50	4 months	D. 5 mos.	(Left) 2nd stage to 2½ in.; vomica at apex; (Right) 2nd stage to 1½ in.
19	00	A. M.	27	25	25	43	35	60	50	35	85	9 months	Uncertain	(Right) consolidation to 1½ in.; vomica at apex; (Left) 2nd stage throughout, except lower lobe behind.
20	00	M. M.	24	70	13	20	70	50	35	40	70	1½ year	D. 2 yrs.	(Right) consolidation to 6 in., 2nd stage; (Left) healthy.

TABLE 5.—*Phthisis. Exceptional Cases.*

No.	Sex.	Initials.	Age.	Page.	Clavicles.				3rd ribs.				Duration.		Remarks.
					U.	F.	F.	U.	U.	F.	F.	U.	Before.	After.	
1	F.	M. D.	16½	00	65	55	65	120	75	70	90	110	2	D. 1	(Left) 2nd stage to 2 in.; (Right) incipient deposit.
2	F.	A. S.	16	00	50	50	45	55	60	50	75	65	1	D. 9 mos.	(Left) 2nd stage to 5 in.; vomica at apex behind; (Right) healthy.
3	M.	D. H.	18	00	...	...	...	...	60	45	55	70	α	α	(Left) 1st stage at apex; (Right) healthy.
4	F.	F. S.	16	00	...	...	...	...	40	40	55	45	6 mos.	D. 15 mos.	(Left) 2nd stage at apex; (Right) healthy.
5	F.	F. A.	19	00	30	40	45	40	75	55	70	65	1	D. 11 mos.	(Left) 2nd stage to 5 in.; (Right) healthy.
6	F.	A. G.	20	00	70	35	70	95	70	55	70	90	15 mos.	D. 7 mos.	Right deposit to 2 in.; (Left) incipient deposit; D. of acute tubercle.
7	M.	J. A.	20	00	45	25	25	60	70	35	45	70	1½	D. 1	(Left) 2nd stage to 3 in.; (Right) incipient deposit to 1 in.
8	M.	F. B.	11	00	45	35	35	45	90	70	90	100	α	α	(Right) 2nd stage; (Left) 2nd stage.
9	M.	P. E.	15	00	40	15	25	45	100	65	80	130	15 mos.	α	(Right) upper lobe consolidated; vomica at apex; (Left) healthy.
10	M.	J. S.	27	00	...	...	...	...	90	80	85	105	1½	D. 15 mos.	(Left) 1st stage to 3 in.; (Right) healthy; D. of hæmorrhage.
11	M.	D. M.	26	00	50	55	55	40	85	95	95	100	1½	α	(Right) 2nd stage to 7 in.; (Left) vomica at apex (syphilis).
12	M.	H. M.	24	00	...	...	...	...	70	60	70	90	1	D. 1½	(Left) 2nd stage to 4 in.; (Right) healthy; D. of hæmorrhage.



TABLE 5.—*Phthisis. Exceptional Cases.*

No.	Sex.	Initials.	Age.	Page.	Clavicles.				3rd ribs.				Duration.		Remarks.
					U.	F.	F.	U.	U.	F.	F.	U.	Before.	After.	
1	F.	M. D.	16½	00	65	55	65	120	75	70	90	110	2	D. 1	(Left) 2nd stage to 2 in.; (Right) incipient deposit.
2	F.	A. S.	16	00	50	50	45	55	60	50	75	65	1	D. 9 mos.	(Left) 2nd stage to 5 in.; vomica at apex behind; (Right) healthy.
3	M.	D. H.	18	00	...	...	...	...	60	45	55	70	α	α	(Left) 1st stage at apex; (Right) healthy.
4	F.	F. S.	16	00	...	...	...	...	40	40	55	45	6 mos.	D. 15 mos.	(Left) 2nd stage at apex; (Right) healthy.
5	F.	F. A.	19	00	30	40	45	40	75	55	70	65	1	D. 11 mos.	(Left) 2nd stage to 5 in.; (Right) healthy.
6	F.	A. G.	20	00	70	35	70	95	70	55	70	90	15 mos.	D. 7 mos.	(Right) deposit to 2 in.; (Left) incipient deposit; D. of acute tubercle.
7	M.	J. A.	20	00	45	25	25	60	70	35	45	70	1½	D. 1	(Left) 2nd stage to 3 in.; (Right) incipient deposit to 1 in.
8	M.	F. B.	11	00	45	35	35	45	90	70	90	100	α	α	(Right) 2nd stage; (Left) 2nd stage.
9	M.	P. E.	15	00	40	15	25	45	100	65	80	130	15 mos.	α	(Right) upper lobe consolidated; vomica at apex; (Left) healthy.
10	M.	J. S.	27	00	...	...	...	...	90	80	85	105	1½	D. 15 mos.	(Left) 1st stage to 3 in.; (Right) healthy; D. of hæmorrhage.
11	M.	D. M.	26	00	50	55	55	40	85	95	95	100	1½	α	(Right) 2nd stage to 7 in.; (Left) vomica at apex (syphilis).
12	M.	H. M.	24	00	...	...	...	...	70	60	70	90	1	D. 1½	(Left) 2nd stage to 4 in.; (Right) healthy; D. of hæmorrhage.



### EXPLANATION OF DIAGRAMS.

1.—Chart 1. Phthisis: chronic cases (males); movements of clavicles and third ribs.

2.—Chart 2. Phthisis: acute cases (males); movements of clavicles and third ribs; average movements in health (males).

3.—Chart 3. Phthisis: chronic cases (females); movements of clavicles and third ribs.

4.—Chart 4. Phthisis: Acute cases (females); movements of clavicles and third ribs; average movements in health (females).

5.—Chart 5. Exceptional cases: (a) youthful cases; (b) accidental and complicated cases.

6.—Chart 6. Repeated measurements.

The figures with diagonal lines show the extent of the forward movement of the clavicles and third ribs, the black figures the corresponding extent on the two sides of the chest of the movements in the upward direction.





Chart 1.

# PHTHISIS. CHRONIC CASES. (MALES.) MOVEMENTS OF CLAVICLES & 3<sup>rd</sup> RIBS.

	Upwards	Worst Side	Forwards	Forwards.	Best Side.	Upwards.
1.	J.W. Æt. 85. 35 years ago, Vomica at apex (authority Dr C.J.B. Williams) now no physical signs (c) x				RESULTS Living 5 years after.	
2.	E.W. Æt. 48. Commenced 5 years ago consolidation to 4 in. (Right)				L. 1 year after (Left) healthy.	
3.	J.K. Æt. 40. 5 years (Left) large dry Vomica to 4 in. x				Result uncertain Right 2 <sup>nd</sup> stage to 6 in.	
4.	M.B. Æt. 40. 9 years before Dr H. Bennett found Vomica (Right) (c) x				Now no physical signs. Living 9 years after.	
5.	R.H. Æt. 31. 2 years (Left) 1 <sup>st</sup> stage at apex.				(Right) healthy. L. 1 year after.	
6.	J.W. Æt. 17. 8 mo (Left) 1 <sup>st</sup> stage to 1½ in. (c)				(Right) healthy. L. 7 years after.	
7.	J.J. Æt. 35. 2 years (Left) 2 <sup>nd</sup> stage to 5 in. (c)				(Right) 1 <sup>st</sup> stage to 1½ in D. 2 years after.	
8.	N.G. Æt. 26. 6 years (Left) deposit to 5 in.				(Right) healthy. D. 2 years after.	
9.	G.C. Æt. 57. 10 years (Left) 2 <sup>nd</sup> stage to 4 in. (c)				(Right) healthy. Living 8 years after.	
10.	D.L. Æt. 28. 3 years (Right) dry Vomica to 3 in. x				(Left) incip <sup>t</sup> consol <sup>n</sup> result uncertain.	
11.	J.D. Æt. 42. 4 years (Right) 1 <sup>st</sup> stage to 2 in.				(Left) incip <sup>t</sup> deposit at apex result uncertain.	
12.	G.S. Æt. 25. 1 year (Left) 1 <sup>st</sup> stage to 3 in.				(Right) healthy. D. 3 years after.	
13.	A.W.L. Æt. 54. 2 years (Left) incip <sup>t</sup> deposit to 1½ in. (c)				(Right) Consol <sup>n</sup> to 4½ in. Vomica at apex. Living 11 years after	
14.	F.G. Æt. 25. 7 years (Right) 1 <sup>st</sup> stage to 2 in. (c)				(Left) Consol <sup>n</sup> to 3 in. Vomica at apex (S) <sup>1</sup> D. 2 years after.	
15.	J.G. Æt. 67. 34 years before pronounced on left side by Sir T. Waters & Sir J. Clarke. (c)				L. 5 years after. no physical signs.	
16.	H.W. Æt. 29. 4 years (Hæmop <sup>t</sup> ) (Left) upper lobe 2 <sup>nd</sup> stage. (c)				D. 2 years after. (Right) healthy.	
17.	T.R. Æt. 36. 3 years (Hæmop <sup>t</sup> ) (Left) 2 <sup>nd</sup> stage to 1½ in.				L. 18 mo after. (Right) healthy.	
18.	F.A. Æt. 27. 5 years before consol <sup>n</sup> of left apex (Dr C.J.B. Williams) (c)				L. 5 years after (Right) healthy.	
19.	W.C. Æt. 38. Dr Walshe found Ptharisis on left side 5 years after.				L. 7 years after. no physical signs.	
20.	G.L. Æt. 48. 9 years (Left) consol <sup>n</sup> to 2 in. (c)				L. 8 years after (Right) slight dep <sup>t</sup> of apex.	
21.	E.S. Æt. 17. 1 year deposit 1 <sup>st</sup> stage at (Right) apex.				L. 3 years after (Left) healthy.	
22.	J.T. Æt. 18. 3 years before (Right) 2 <sup>nd</sup> stage to 3 in. (c)				L. 1 year after (Left) incip <sup>t</sup> dep <sup>t</sup> under clavicle. (c)	
23.	J.P. Æt. 25. 4 years (Left) deposit to 5 in. large. Vomica at apex. x				D. 4 years after. (Right) upper lobe 2 <sup>nd</sup> stage.	
24.	I.G. Æt. 61. 1 year (Right) 1 <sup>st</sup> stage 2 in.				D. 10 years after. (Left) healthy.	
25.	W.I. Æt. 27. 2 years (Left) 1 <sup>st</sup> stage to 2 in.				L. 2 years after (Right) healthy.	

Chart 2.

# PHTHISIS. ACUTE CASES. (MALES) MOVEMENTS OF CLAVICLES & 3<sup>rd</sup> RIBS.

Upward.	Worst Side.	Forwards	Forwards.	Best Side.	Upward
1.	D.W. Et. 49.4 mo <sup>t</sup> (Left) extensive deposit 3 <sup>rd</sup> stage.	x		D. a few months after (Right) incip <sup>t</sup> disease in upper lobe.	
2.	J.C. Et. 27.3 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage to 3 in.			D. 18 mo <sup>t</sup> after (Right) 3 <sup>rd</sup> stage to 1½ in.	
3.	J.P. Et. 21.4 mo <sup>t</sup> (Right) deposit to 4 in large Vomica at apex.	x		Results uncertain (Right) incip <sup>t</sup> deposit.	
4.	I.K. Et. 28.8 mo <sup>t</sup> (Left) 3 <sup>rd</sup> stage to 4 in. (C)	x		D. 16 mo <sup>t</sup> after (Right) Vomica at apex.	
5.	E.S. Et. 21. Dura <sup>t</sup> 1 year before exam <sup>t</sup> 3 <sup>rd</sup> stage Pneum <sup>t</sup> (Right).	x		D. 1 year after (Left) healthy.	
6.	J.H. Et. 34.18 mo <sup>t</sup> 2 <sup>nd</sup> stage to 4 in (Right)			D. 4 mo <sup>t</sup> after (Left) 1 <sup>st</sup> stage to 1½ in.	
7.	J.M. Et. 25.12 mo <sup>t</sup> large advancing Vomica on (Left) (C)	x		D. 1 year after (Right) deposit to 4 in. 2 <sup>nd</sup> stage.	
8.	J.C. Et. 28.16 mo <sup>t</sup> Laryngitis (Left) deposit to 6 in 3 <sup>rd</sup> stage	x		D. 1 year after (Right) deposit 2 <sup>nd</sup> stage to 2 in.	
9.	S.E. Et. 22.18 mo <sup>t</sup> 3 <sup>rd</sup> stage (Right).	x		D. in 6 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage to 4 in.	
10.	W.C. Et. 19.18 mo <sup>t</sup> (Hemop <sup>t</sup> ) (Left) 2 <sup>nd</sup> stage to 3 in.			D. 1 week after suddenly (Right) Vomica at apex.	
11.	C.J. Et. 67.3 mo <sup>t</sup> 2 <sup>nd</sup> stage to 3 in (Right).			D. in 3 mo <sup>t</sup> (Left) healthy.	
12.	H.S. Et. 22.4 mo <sup>t</sup> dep <sup>t</sup> to 2 in (Left) 2 <sup>nd</sup> stage.			D. in 9 mo <sup>t</sup> (Right) healthy.	
13.	J.S. Et. 52.6 mo <sup>t</sup> (Left) consol <sup>t</sup> to 4 in 2 <sup>nd</sup> stage.			D. in 6 mo <sup>t</sup> (Right) consol <sup>t</sup> of apex.	
14.	J.W. Et. 48.1 year (Left) consol <sup>t</sup> to 4 in.			D. 4 mo <sup>t</sup> after (Right) incip <sup>t</sup> deposit under clavicle	
15.	M.D. Et. 36.1½ year (Right) incip <sup>t</sup> disease at apex Hemop <sup>t</sup> (C)			D. in 1 year after (Left) deposit to 6 in Vomica at apex.	
16.	J.L. Et. 45.1 year (Laryngitis) (Right) to 6 in Vomica under clav.	x		D. in 1 year after (Left) 2 <sup>nd</sup> stage to 2½ in.	
17.	W.C. Et. 17.1½ year (Left) 1 <sup>st</sup> stage to 1½ in.			D. a few mo <sup>t</sup> after (Right) 2 <sup>nd</sup> stage to 5 in Vomica at apex	
18.	C.D. Et. 36.2 years consol <sup>t</sup> to 4 in 3 <sup>rd</sup> stage (Right).	x		D. in 2 mo <sup>t</sup> (Left) softening deposit to 3 in.	
19.	J.B. Et. 30.2 <sup>nd</sup> stage to 5 in (Left)			D. in 18 mo <sup>t</sup> (Right) healthy.	
20.	A.B. Et. 19.12 mo <sup>t</sup> (Right) consol <sup>t</sup> throughout 3 <sup>rd</sup> stage at apex.	x		D. (Left) incip <sup>t</sup> deposit.	
AVERAGE MOVEMENTS			IN HEALTH (MALES)		
21.	J.B. Et. 45. Healthy Male.				
22.	A.J. Et. 35. Healthy Male.				
23.	H.F. Et. 11 years. Healthy Boy				
24.	C.L. Et. 58. Healthy Old Man.				





Chart 3.

# PHTHISIS. CHRONIC CASES. (FEMALES.) MOVEMENTS OF CLAVICLES & 3<sup>rd</sup> RIBS.

	Upwards	Worst Side.	Forwards	Forwards.	Best Side.	Upwards.
1		M <sup>rs</sup> J. Æt. 30. 4 years (Right) deposit to 4 in 2 <sup>nd</sup> stage.			(Left) healthy. D. 1½ year after.	
2		M <sup>rs</sup> B. Æt. 50. 4 years (Right). 2 <sup>nd</sup> stage to 2 in. (c)			(Left) healthy. L. 10 years after.	
3		M. W. Æt. 25. 8 years (Hæmop?) Vomica Pneumothorax Left side. x			(Right) healthy. Living 5 years after. (c)	
4		M <sup>rs</sup> B. Æt. 32. 3 years dep <sup>o</sup> to 5 in. Vomica under 3 <sup>rd</sup> rib (Right). x			(Left) incipient dep <sup>o</sup> . D. 2 years after.	
5		M <sup>rs</sup> S. Æt. 34. 5½ years (Right) softening deposit to 2 in.			(Left) healthy. L. 1 year after.	
6		E. G. Æt. 27. 2 years (Left) deposit to 4 in 3 <sup>rd</sup> stage. x			(Right) incip <sup>o</sup> deposit. D. 2 years after.	
7		F. J. Æt. 28. 2½ years (Right) 1 <sup>st</sup> stage to 3 in.			(Left) healthy. D. 2 years after of internal hæmorrhage.	
8		A. P. Æt. 30. 1 year (Right) incip <sup>o</sup> deposit to 4 in.			(Left) healthy. L. improved 18 mo <sup>a</sup> after.	
9		M <sup>rs</sup> C. Æt. 35. 2 years Hæmop? (Left) 1 <sup>st</sup> stage to 3 in softening at apex. (c)			(Right) healthy. Living 8 years after no advance.	
10		M <sup>rs</sup> D. Æt. 30. 18 mo <sup>a</sup> ago Dr. C. J. B. Williams found tubercular disease on left side now dep <sup>o</sup> to 1½ in 1 <sup>st</sup> stage. (c)			L. 6 years after. Right side healthy.	
11		M <sup>rs</sup> SW. Æt. 29. 3 years (Left) large dry Vomica x			(Right) incip <sup>o</sup> deposit at apex. D. 2 years after.	
12		G. S. Æt. 28. 30 years ago Hæmop <sup>o</sup> consol <sup>o</sup> at apex of (Right)			L. 5 years after. (Left) healthy.	
13		M <sup>rs</sup> S. Æt. 30. 2 years (Right) 1 <sup>st</sup> stage to 3 in.			L. 8 years after. (Left) healthy. (c)	
14		F. M. Æt. 23. 18 mo <sup>a</sup> (Right) 1 <sup>st</sup> stage to 2 in.			D. 3 years after. (Left) healthy. (c)	
15		A. F. Æt. 20. 8 years before Phth <sup>o</sup> diagnosed by Dr. Symonds Left large dry Vomica at back.			D. 2 years after. (Right) 1 <sup>st</sup> stage to 3 in.	
16		M <sup>rs</sup> W. Æt. 27. P 4 years (Right) softening deposit to 4 in. (c)			D. 2 years after (Left) incip <sup>o</sup> deposit to 1½ in. (c)	
17		J. C. Æt. 29. 1 year (Left) deposit to 2 in 2 <sup>nd</sup> stage.			Living 6 years after (Right) healthy.	
18		J. F. Æt. 23. 4 years deposit to 2 in (Right) Vomica at apex. x			L. 1 year after improving (Left) healthy.	
19		M. R. Æt. 23. 2 years (Left) 1 <sup>st</sup> stage to 2 in. (c)			Living 9 years after (Right) healthy.	
20		S. J. Æt. 25. 3 years (Left) 2 <sup>nd</sup> stage to 6 in.			L. 5 years after. (Right) healthy.	
21		S. K. Æt. 35. 1 year (Left) incip <sup>o</sup> dep <sup>o</sup> to 2 in frequent Hæmop <sup>o</sup>			L. 5 years after (Right) healthy.	
22		M <sup>rs</sup> J. Æt. 33. 3 mo <sup>a</sup> (Right) deposit to 2 in 2 <sup>nd</sup> stage.			L. 7 years after (Left) healthy.	
23		M <sup>rs</sup> S. Æt. 42. 8 years (Right) consol <sup>o</sup> of upper lobe behind. (c)			L. 1 year after (Left) healthy.	
24		R. C. Æt. 20. 2 years (Right) incip <sup>o</sup> deposit to 3 in. (c)			L. 2 years after (Left) healthy.	
5		E. H. Æt. 36. 1 year (Right) apex consol <sup>o</sup>			L. improved 1 year after (Left) healthy.	

Chart 4.

# PHTHISIS. ACUTE CASES. (FEMALES). MOVEMENTS OF CLAVICLES & 3<sup>rd</sup> RIBS.

Upwards

Worst Side.

Forwards

Forwards.

Best Side.

Upwards

Upwards	Worst Side.	Forwards	Forwards.	Best Side.	Upwards
1.	S.G. Æt. 30. (Left) extensive deposit Vomica at apex.	x		D. in few weeks (Right) 2 <sup>nd</sup> stage to 6 in.	
2.	M <sup>rs</sup> R. Æt. 39. 8 mo <sup>2</sup> (Right) consol <sup>n</sup> to 6 in 3 <sup>rd</sup> stage.			D. few months after. (Left) incip <sup>t</sup> deposit.	
3.	M. S. Æt. 20. 1 year (Right) 2 <sup>nd</sup> stage throughout.			D. 1 mo <sup>2</sup> after. (Left) incip <sup>t</sup> deposit.	
4.	B. H. Æt. 24. Origin doubtful (Left) dep <sup>t</sup> to 4 in Vomica at apex.	x		D. a few mo <sup>2</sup> after. (Right) apex 2 <sup>nd</sup> stage.	
5.	B. C. Æt. 26. Date of origin uncertain (Right) consol <sup>n</sup> to 6 in 2 <sup>nd</sup> stage.			D. in 3 mo <sup>2</sup> (Left) softening deposit to 2 in.	
6.	J. T. Æt. 25. 18 mo <sup>2</sup> (Right) 3 <sup>rd</sup> stage to 4 in.	x		D. in 5 mo <sup>2</sup> (Left) consol <sup>n</sup> to 3 in.	
7.	M <sup>rs</sup> R. Æt. 25. 8 mo <sup>2</sup> (Left) dep <sup>t</sup> to 5 in 3 <sup>rd</sup> stage.	x		D. in 6 mo <sup>2</sup> (Right) 2 <sup>nd</sup> to 2½ in.	
8.	M <sup>rs</sup> H. Æt. 47. 5 mo <sup>2</sup> (Left) 2 <sup>nd</sup> stage to 5 in.			D. Result doubtful (Right) 2 <sup>nd</sup> stage to 3 in Vomica at apex.	
9.	M <sup>rs</sup> W. Æt. 33. Origin uncertain (Left) extensive dep <sup>t</sup> 2 <sup>nd</sup> stage.			D. in 6 mo <sup>2</sup> (Right) incip <sup>t</sup> deposit at apex.	
10.	M <sup>rs</sup> R. Æt. 26. 18 mo <sup>2</sup> (Right) 2 <sup>nd</sup> stage to 4 in.			D. 6 mo <sup>2</sup> after. (Left) incipient deposit.	
11.	M <sup>rs</sup> S. Æt. 45. 3 mo <sup>2</sup> Larvæ in (Left) consol <sup>n</sup> to 3 in Vomica under clavicle.			D. 1 year after. (Right) healthy.	
12.	M <sup>rs</sup> J. Æt. 38. 2 years. 2 <sup>nd</sup> stage to 6 in (Left)			D. 8 mo <sup>2</sup> after (Right) incip <sup>t</sup> deposit at apex.	
13.	A. I. Æt. 36. 18 mo <sup>2</sup> Hemopt <sup>y</sup> (Left) dep <sup>t</sup> to 5 in 2 <sup>nd</sup> stage at apex.			D. 6 mo <sup>2</sup> after (Right) 2 <sup>nd</sup> stage.	
14.	E. J. Æt. 20. 18 mo <sup>2</sup> (Left) deposit to 6 in 3 <sup>rd</sup> stage.	x		Result uncertain (Right) 2 <sup>nd</sup> stage to 4 in Vomica at apex.	
15.	S. B. Æt. 25. 2 mo <sup>2</sup> (Right) incip <sup>t</sup> deposit to 1 in.			D. 4 mo <sup>2</sup> after. (Left) 3 <sup>rd</sup> stage at apex.	
16.	H. M. Æt. 20. 5 mo <sup>2</sup> (Right) consol <sup>n</sup> to 5 in Vomica at apex.	x		D. a few mo <sup>2</sup> after (Left) healthy.	
17.	C. H. Æt. 23. 3 mo <sup>2</sup> (Left) 2 <sup>nd</sup> stage to 2 in.			D. uncertain (Right) healthy.	
18.	M <sup>rs</sup> M. Æt. 29. 4 mo <sup>2</sup> (Left) 2 <sup>nd</sup> stage to 2 in Vomica at apex.	x		D. 5 mo <sup>2</sup> after (Right) 2 <sup>nd</sup> stage to 1½ in.	
19.	A. M. Æt. 27. 9 mo <sup>2</sup> (Right) consol <sup>n</sup> to 1½ in Vomica at apex.	x		Result uncertain (Left) 2 <sup>nd</sup> stage except lower half behind.	
20.	M. M. Æt. 24. 18 mo <sup>2</sup> (Right) consol <sup>n</sup> to 6 in 2 <sup>nd</sup> stage.			D. in 2 years. (Left) healthy.	
21.	AVERAGE MOVEMENTS IN			HEALTH. (FEMALE) OCT. 34.	



Chart 4.

# PHTHISIS. ACUTE CASES. (FEMALES). MOVEMENTS OF CLAVICLES & 3<sup>rd</sup> RIBS.

Upwards      Worst Side.      Forwards      Forwards.      Best Side.      Upwards

1.	S.G. Æt. 30. (Left) extensive deposit Vomica at apex.	x	D. in few weeks (Right) 2 <sup>nd</sup> stage to 6 in.	
2.	M <sup>rs</sup> R. Æt. 39. 8 mo <sup>t</sup> (Right) consol <sup>n</sup> to 6 in 3 <sup>rd</sup> stage.		D. few months after. (Left) incip <sup>t</sup> deposit.	
3.	M. S. Æt. 20. 1 year (Right) 2 <sup>nd</sup> stage throughout.		D. 1 mo <sup>t</sup> after (Left) incip <sup>t</sup> deposit.	
4.	B. H. Æt. 24. Origin doubtful (Left) dep <sup>t</sup> to 4 in Vomica at apex.	x	D. a few mo <sup>t</sup> after (Right) apex 2 <sup>nd</sup> stage.	
5.	B. C. Æt. 26. Date of origin uncertain (Right) consol <sup>n</sup> to 4 in 2 <sup>nd</sup> stage.		D. in 3 mo <sup>t</sup> (Left) softening deposit to 2 in.	
6.	J. T. Æt. 25. 18 mo <sup>t</sup> (Right) 3 <sup>rd</sup> stage to 4 in.	x	D. in 5 mo <sup>t</sup> (Left) consol <sup>n</sup> to 3 in.	
7.	M <sup>rs</sup> R. Æt. 25. 8 mo <sup>t</sup> (Left) dep <sup>t</sup> to 5 in 3 <sup>rd</sup> stage.	x	D. in 6 mo <sup>t</sup> (Right) 2 <sup>nd</sup> to 2½ in.	
8.	M <sup>rs</sup> H. Æt. 47. 5 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage to 5 in.		D. Result doubtful (Right) 2 <sup>nd</sup> stage to 3 in Vomica at	
9.	M <sup>rs</sup> W. Æt. 33. Origin uncertain (Left) extensive dep <sup>t</sup> 2 <sup>nd</sup> stage.		D. in 6 mo <sup>t</sup> (Right) incip <sup>t</sup> deposit at apex.	
10.	M <sup>rs</sup> R. Æt. 26. 18 mo <sup>t</sup> (Right) 2 <sup>nd</sup> stage to 4 in.		D. 6 mo <sup>t</sup> after (Left) incipient deposit.	
11.	M <sup>rs</sup> S. Æt. 45. 3 mo <sup>t</sup> Laryngitis (Left) consol <sup>n</sup> to 3 in Vomica under clavicles.		D. 1 year after (Right) healthy.	
12.	M <sup>rs</sup> J. Æt. 38. 2 years. 2 <sup>nd</sup> stage to 6 in (Left)		D. 8 mo <sup>t</sup> after (Right) incip <sup>t</sup> deposit at apex.	
13.	A. I. Æt. 36. 18 mo <sup>t</sup> Hemopt <sup>y</sup> (Left) dep <sup>t</sup> to 5 in 2 <sup>nd</sup> stage at apex.		D. 6 mo <sup>t</sup> after (Right) 2 <sup>nd</sup> stage.	
14.	E. J. Æt. 20. 18 mo <sup>t</sup> (Left) deposit to 6 in 3 <sup>rd</sup> stage.	x	Result uncertain (Right) 2 <sup>nd</sup> stage to 4 in Vomica at apex.	
15.	S. B. Æt. 25. 2 mo <sup>t</sup> (Right) incip <sup>t</sup> deposit to 1 in.		D. 4 mo <sup>t</sup> after (Left) 3 <sup>rd</sup> stage at apex.	
16.	H. M. Æt. 20. 5 mo <sup>t</sup> (Right) consol <sup>n</sup> to 5 in Vomica at apex.	x	D. a few mo <sup>t</sup> after (Left) healthy.	
17.	C. H. Æt. 23. 3 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage to 2 in.		D. uncertain (Right) healthy.	
18.	M <sup>rs</sup> M. Æt. 29. 4 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage to 2 in Vomica at apex.	x	D. 5 mo <sup>t</sup> after (Right) 2 <sup>nd</sup> stage to 1½ in.	
19.	A. M. Æt. 27. 9 mo <sup>t</sup> (Right) consol <sup>n</sup> to 1½ in Vomica at apex.	x	Result uncertain (Left) 2 <sup>nd</sup> stage except lower half behind.	(C)
20.	M. M. Æt. 24. 18 mo <sup>t</sup> (Right) consol <sup>n</sup> to 6 in 2 <sup>nd</sup> stage.		D. in 2 years. (Left) healthy.	(C)
21.	AVERAGE MOVEMENTS IN			HEALTH. (FEMALE) OCT. 34.



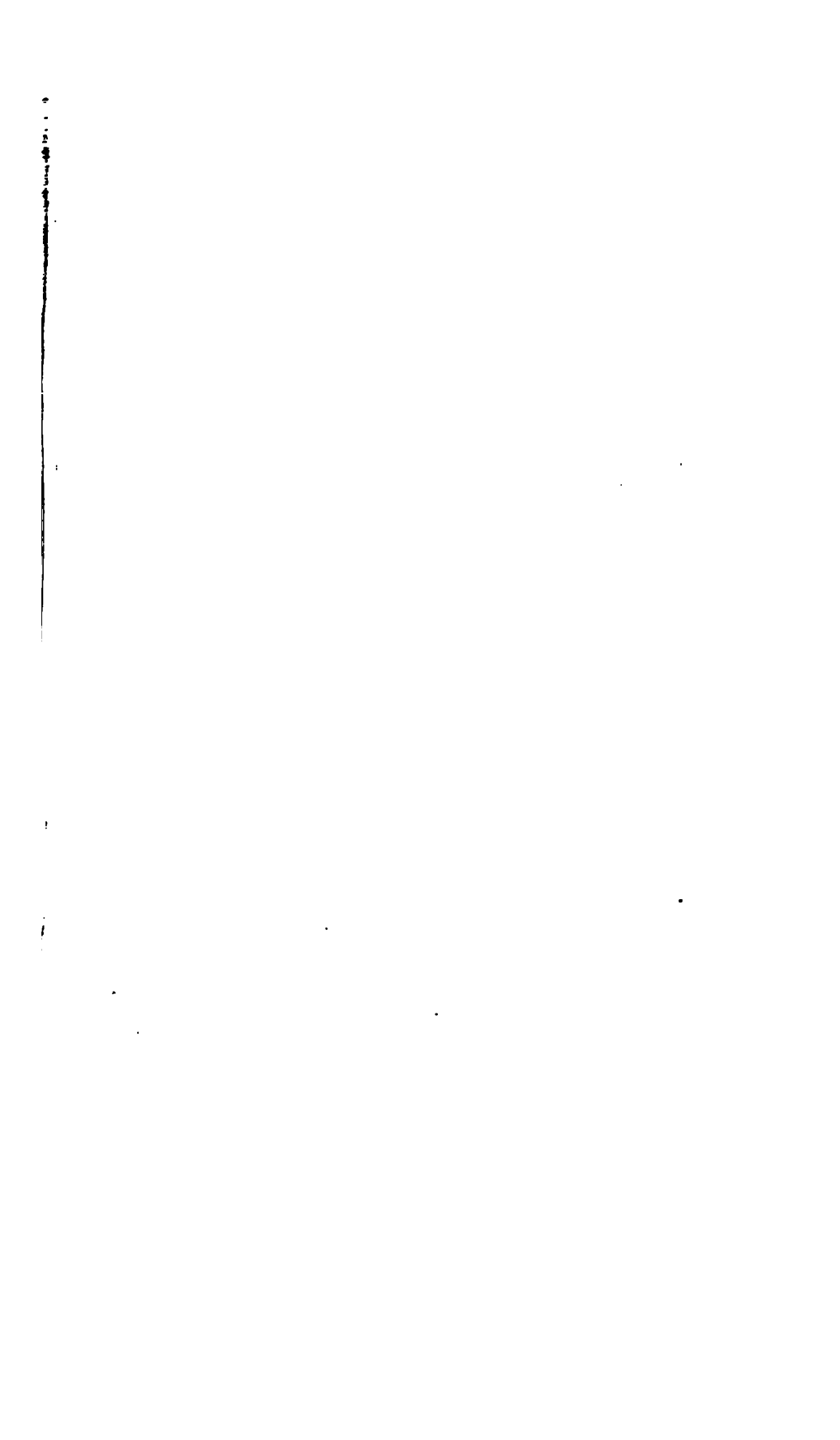


Chart 5.

# EXCEPTIONAL CASES. a. YOUTHFUL CASES.

Upwards.	Forwards.	Forwards	Upwards.
1. M.D. Et. 16½. [F] 2 years (Left) 2 <sup>nd</sup> stage to 3 in.		(Right) incip <sup>t</sup> deposit. Died in 1 year.	
2. A.S. Et. 16. [F] 1 year (Left) 2 <sup>nd</sup> stage to 5 in. Vomica at apex behind.		(Right) healthy. Died in 9 mo <sup>t</sup> .	
3. D.H. Et. 18. [M] Doubtful duration (Left) 1 <sup>st</sup> stage at apex.		(Right) healthy. Result not known.	
4. F.S. Et. 16. [F] 6 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage at apex.		(Right) healthy. Died in 15 mo <sup>t</sup> .	
5. F.A. Et. 19. [F] 1 year (Left) 2 <sup>nd</sup> stage to 4 or 5 in.		(Right) healthy. Died in 11 mo <sup>t</sup> .	
6. A.G. Et. 20. [F] 15 mo <sup>t</sup> . (Right) consol <sup>t</sup> to 2 in. Vomica at apex.		(Left) Commencing dep <sup>t</sup> . Died in 7 mo <sup>t</sup> from acute general	
7. J.A. Et. 20. (appeared 15) [M] 18 mo <sup>t</sup> (Left) 2 <sup>nd</sup> stage to 3 in.		(Right) incipient deposit to 1 in. Died in 1 year.	
8. F.B. Et. H. [M] Origin uncertain (Right) 2 <sup>nd</sup> stage.		(Left) 2 <sup>nd</sup> stage. Result uncertain.	
9. P.F. Et. 15. [M] 15 mo <sup>t</sup> . (Right) upper lobe consol <sup>t</sup> . Vomica at apex.		(Left) healthy. Result uncertain probably not long decayed.	

## b. ACCIDENTAL & COMPLICATED CASES.

10. J.S. Et. 27. 18 mo <sup>t</sup> (Left) 1 <sup>st</sup> stage to 3 in. profuse hemorrhage.	(Right) healthy. Died in 15 mo <sup>t</sup> from hemorrhage.
11. D.M. Et. 26. [M] 18 mo <sup>t</sup> . (Right) 2 <sup>nd</sup> stage to 7 in. Syphilitic.	(Left) Vomica at apex. Result uncertain probably speedy
12. H.M. Et. 24. [M] 1 year (Left) 2 <sup>nd</sup> stage to 4 in. profuse hem- orrhage.	(Right) healthy. Died 18 mo <sup>t</sup> after.

Chart 6.

## REPEATED

## MEASUREMENTS.

	ACUTE PHTHISIS (MALE)	DIMINISHING READINGS
1.		
2.	CHRONIC PHTHISIS (MALE)	INCREASING READINGS.
3.	CHRONIC PHTHISIS (FEMALE)	INCREASING READINGS
4.	ACUTE PHTHISIS (MALE)	DIMINISHED 'FORWARD' INCREASED 'UPWARD'
5.	CHRONIC PHTHISIS (FEMALE)	INCREASED 'FORWARD' DIMINISHED 'UPWARD' (on affected side)
6.	CHRONIC PHTHISIS (MALE)	MIXED CASE
	STATIONARY 'FORWARD'	INCREASED 'FORWARD' INCREASED 'UPWARD'
	VARIED 'UPWARD'	



Chart 5.

EXCEPTIONAL CASES.  
a. YOUTHFUL CASES.

Upwards.	Forwards.	Forwards.	Upwards.
1. M.D. Æt. 16½. [F] 2 years. (Left) 2 <sup>nd</sup> stage to 3 in.		(Right) incip <sup>t</sup> deposit. Died in 1 year.	
2. A.S. Æt. 16. [F] 1 year. (Left) 2 <sup>nd</sup> stage to 5 in. Vomica at apex behind.		(Right) healthy. Died in 9 mo <sup>t</sup>	
3. D.H. Æt. 18. [M] Doubtful duration. (Left) 1 <sup>st</sup> stage at apex.		(Right) healthy. Result not known.	
4. F.S. Æt. 16. [F] 6 mo <sup>t</sup> . (Left) 2 <sup>nd</sup> stage at apex.		(Right) healthy. Died in 15 mo <sup>t</sup>	
5. F.A. Æt. 19. [F] 1 year. (Left) 2 <sup>nd</sup> stage to 4 or 5 in.		(Right) healthy. Died in 11 mo <sup>t</sup>	
6. A.G. Æt. 20. [F] 15 mo <sup>t</sup> . (Right) consol <sup>t</sup> to 2 in. Vomica at apex.		(Left) Commencing dep <sup>t</sup> . Died in 7 mo <sup>t</sup> from acute general	
7. J.A. Æt. 20. (appeared 15) [M] 18 mo <sup>t</sup> . (Left) 2 <sup>nd</sup> stage to 3 in.		(Right) incipient deposit to 1 in. Died in 1 year.	
8. F.B. Æt. 14. [M] Origin uncertain. (Right) 2 <sup>nd</sup> stage.		(Left) 2 <sup>nd</sup> stage. Result uncertain.	
9. P.F. Æt. 15. [M] 15 mo <sup>t</sup> . (Right) upper lobe consol <sup>t</sup> . Vomica at apex.		(Left) healthy. Result uncertain probably not long decayed.	

b. ACCIDENTAL & COMPLICATED CASES.

10. J.S. Æt. 27. 18 mo <sup>t</sup> . (Left) 1 <sup>st</sup> stage to 3 in. profuse hæmorrhage.	(Right) healthy. Died in 15 mo <sup>t</sup> from hæmorrhage.
11. D.M. Æt. 26. [M] 18 mo <sup>t</sup> . (Right) 2 <sup>nd</sup> stage to 7 in. Syphilitic.	(Left) Vomica at apex. Result uncertain probably speedy
12. H.M. Æt. 24. [M] 1 year. (Left) 2 <sup>nd</sup> stage to 4 in. profuse hæmorrhage.	(Right) healthy. Died 18 mo <sup>t</sup> after.

Chart 6.

REPEATED MEASUREMENTS.

	ACUTE PHTHISIS (MALE)	DIMINISHING READINGS
1.		
2.	CHRONIC PHTHISIS (MALE)	INCREASING READINGS.
3.	CHRONIC PHTHISIS (FEMALE)	INCREASING READINGS
4.	ACUTE PHTHISIS (MALE)	DIMINISHED 'FORWARD' INCREASED 'UPWARD'
5.	CHRONIC PHTHISIS (FEMALE)	INCREASED 'FORWARD' DIMINISHED 'UPWARD' (on affected side)
6.	CHRONIC PHTHISIS (MALE)	MIXED CASE
	STATIONARY 'FORWARD'	INCREASED 'FORWARD' INCREASED 'UPWARD'



ON  
A PROBABLE CAUSE OF LEAD COLIC.

BY  
C. HILTON FAGGE, M.D., F.R.C.P.,  
PHYSICIAN TO, AND LECTURER ON PATHOLOGY AT, GUY'S HOSPITAL.

---

(Received January 11th—Read March 8th, 1881.)

---

IN 1876 I communicated to the Society a short paper "On the Nature and Mode of Origin of the Lead Line in the Gums," which will be found in the fifty-ninth volume of the 'Transactions.' I did not then know that about a year previously a French observer, M. Cras, had published in the 'Archives de Médecine Navale' precisely the same view as that which my own observations had led me to adopt.<sup>1</sup> My first acquaintance with the investigations of M. Cras was derived from a notice of them which appeared in the 'Lancet' for 1878.

M. Cras differed from me in having taken the portions of mucous membrane which he examined from the living, and not from the dead subject. And he proposed to make a practice of slicing off with a lancet a minute fragment of the gum in all cases in which the microscope might serve to clear up the nature of a blue or black stain, the character of which would otherwise be uncertain. This

<sup>1</sup> "Du Liséré Plombique," par le Dr. C. Cras, 'Arch. de Méd. Nav.,' Février, 1875.

procedure was adopted some time ago in a case under my care, and with a perfectly satisfactory result. Another point noted by M. Cras is that after a portion of gingival tissue blackened by lead was placed in nitric acid the vascular loops assumed a whitish-yellow colour, the sulphide of lead being converted into a white sulphate, while the substance of the capillary walls was turned yellow by the action of the acid.

A much more important matter, on which both M. Cras and I expressed identical opinions, was as to the probable formation of sulphide of lead in the mucous membrane of the intestine, by the reaction of sulphuretted hydrogen contained in the intestinal gases upon a soluble combination of the metal circulating in the more superficial capillaries. M. Cras, however, had had no chance of examining the interior of the body in a case of chronic plumbism. He examined the anal mucous membrane during life, but found no discolouration. I had once made an autopsy in the case of a painter, who had had colic fifteen years before, and who had while in the hospital (before his death from aortic regurgitation) complained of pain about the splenic flexure of the colon. In this instance I had found some slate-coloured cicatrices in that part of the bowel, but I was unable to say that their appearance was really due to impregnation with the metal.

Since the year 1876, however, I have had four opportunities of further investigating the question. And, although in two cases the result was negative, in the other two cases I found that there was marked and extensive blackening of the intestinal mucous membrane, while Dr. Stevenson, who was kind enough to make analyses for me, succeeded in obtaining from the blackened parts considerable quantities of lead.

I have thought it worth while to bring these observations before the Society, not only because they corroborate my former paper, but also because they possess considerable interest, as possibly conveying an explanation of the real nature of lead colic.

CASE 1.—W. J. E—, æt. 36, was admitted into Guy's Hospital under Dr. Wilks on December 21st, 1876, for aortic aneurism. He was a painter, and was said "for three years, off and on, to have had lead colic and palsy," but recently "his hands had been well." He died suddenly on December 30th of hæmorrhage, the result of the ulceration into the left bronchus.

The intestine showed no trace of blackening of its mucous membrane. In the colon there were a few cicatrices, probably the results of an attack of dysentery, which he had had in India several years previously.

There was a marked line on the gums.

CASE 2.—George W—, æt. 31, was admitted into Guy's Hospital under Dr. Pavy on July 21st, 1879. He was by occupation a house-painter. He had lived freely, and had once had a slight attack of gout. Four weeks ago he was seized suddenly, whilst at his work, with a gnawing pain in the lower part of the abdomen. The bowels had been constipated for three days previously. He had diarrhœa for three days, perhaps as the result of purgative medicine; afterwards constipation again set in.

On admission he was still suffering with abdominal pain, and lay principally with the thighs flexed on the abdomen. The tongue was moist and pale. The fæces were small and hard. There was no lead line on the gums. The complexion was earthy looking, as in lead poisoning.

The urine, of sp. gr. 1014, was very albuminous.

On the 24th he was attacked with œdema of the lungs, and died in a few hours.

At the autopsy it was found that there was a little urate of soda in the principal joint of each great toe. The kidneys were small, granular on the surface, and mottled with opaque yellow spots. The heart was hypertrophied, weighing twenty ounces.

The mucous membrane of the lower part of the ileum presented a remarkable appearance. It was covered with black spots, a little larger than solitary follicles. These



had not at all the look of ruptured and pigmented follicles such as are so commonly seen. The discolouration extended down to the ileo-cæcal valve. In the large intestine there was comparatively very little of it.

The microscope showed that the blackening was due to the presence of scattered oval or round granules, which appeared to be aggregated round the walls of the vessels in the villi, although this relation was not so clearly marked as I have found it to be in the lead line on the gums.

An endeavour was made to preserve some of the intestine in spirit, but its discolouration soon ceased to be visible.

Portions of normal and of discoloured intestine were handed for analysis to Dr. Stevenson, who was kind enough to write to me afterwards that, whereas the former "yielded a suspicion of colour with sulphuretted hydrogen, showing that lead or other metal forming dark sulphide was almost absent," he obtained from the latter "conclusive evidence of the presence of the metal, though in small quantity."

CASE 3.—Elizabeth J—, æt. 46, was admitted into Guy's Hospital under the care of Dr. Habershon on October 21st, 1880. She had been an intemperate woman; for three months she had been occupied at lead works. It was believed that she had had at least one epileptic fit several months before. When brought into the ward she was insensible, having had a succession of epileptiform fits; she soon died, the whole duration of her illness being little more than twelve hours.

I made an autopsy, which left the cause of her cerebral symptoms still uncertain, it being impossible to say whether the case was one of epilepsy, or whether the convulsions were due to lead poisoning, or whether the two conditions were combined, the metal having had an especially noxious action upon a person already liable to epileptic seizures. But the large intestine showed a remarkable discolouration. This began abruptly at the ileo-cæcal valve, and the

pouch of the cæcum was perfectly black on its inner surface, except that the solitary follicles projected as nearly white dots. In the course of the colon the abnormal appearance gradually subsided. I sent to Dr. Stevenson's laboratory a large piece of the intestine from this case, and have since received from him the following letter :

October 26th, 1880.

MY DEAR FAGGE,

There was a remarkable difference in the amount of lead in the blackened and the unblackened portions of intestine brought here from the post-mortem-room on Friday last. I took two separate portions for analysis :

1. Small intestine, uncoloured, two ounces. This yielded .0031 gr. of lead, or .00035 per cent.

2. Large intestine, blackened, two ounces. This yielded .0965 gr. of lead, or .01140 per cent.

(Signed)

Very truly yours,

THOMAS STEVENSON.

In other words, the blackened part of the bowel contained more than thirty times as much of the metal as the pale part.

CASE 4.—John W—, æt. 42, was admitted into Guy's Hospital on September 24th, 1880, suffering from Bright's disease, of which he died on December 22nd. It was stated that for eighteen years he had worked at a metallic *cork* manufactory, and that at Easter in 1879 he had suffered from lead colic.

At the autopsy the intestine was found pale in its whole length, there being no trace of any blackening from lead.

It is to be observed that in the two cases in which the intestine was found devoid of discolouration the fact that lead colic had occurred during life rested only on the patients' statements, and that a considerable interval of time had elapsed, during which it is possible that a deposit

of sulphide of lead might have undergone reabsorption. I must leave it to future observers to determine whether such a deposit is really constantly found as an antecedent to lead colic, or whether this is not the case.

EXPERIENCE AND SPECIMENS  
OF  
OX-AORTA LIGATURE,  
AND SOME  
REMARKS ON THE VARIABILITY OF CATGUT.

BY  
RICHARD BARWELL, F.R.C.S.,  
SENIOR SURGEON TO THE CHARING CROSS HOSPITAL.

---

(Received February 26th—Read March 8th, 1881.)

---

Two years ago, namely, on 10th March, 1879, I had the honour to read before this Society a paper, the object of which was threefold.

First.—To point out that certain cases of aortic aneurism might be benefited by deligation of the right carotid and subclavian arteries—an operation which had not previously been proposed or practised for that purpose.

Secondly.—To insist upon the advisability of leaving the inner and middle coats of arteries tied in continuity intact.

Thirdly.—To introduce a form of ligature which in deligation would not cut those tunics.

At that time the experience which I could place at the service of the Society was limited to the one example, which illustrated all those requirements. Even now cases, which

vindicate all the three points I then advanced must in the nature of thing be few.

Since the publication of my paper there have been two cases of deligation of the right carotid and subclavian for aneurism of the aortic arch with the ox-aorta ligature, making in all three such operations.

The first one by myself, on the 14th February, 1879, (the subject of my former communication). The second by Dr. Lediard, at that time of the Cleveland Street Infirmary, operated 26th March, 1880. The third by Dr. Wyeth, of New York, operated September 29th, 1880.

My patient lived sixteen months in fair health and comfort, dying in May, 1880. Dr. Lediard's patient survived rather more than nine months, dying on 22nd December, 1880. Dr. Wyeth's patient is alive. "She is up and able to move about without distress or difficulty. Has no dysphagia or dyspnoea, and no pain in the tumour, which still rapidly diminishes." (Report on Christmas-day, 1880.)<sup>1</sup>

This is the list of the right subclavian and carotid vessels hitherto tied with ox-aorta ligature:

On October 27th I tied the vessels on the left side of the neck of J. K—, æt. 37, suffering from a large thoracic aneurism springing from the transverse arch of the aorta, beyond the origin of the innominate. The man was, previously to operation, evidently approaching death. It was thought that deligation of those vessels might give some

<sup>1</sup> See 'American Journal of Medical Science.' Dr. Wyeth writes: "I am of opinion that the danger of secondary hæmorrhage is greatly lessened by the use of this ligature and believe that its introduction will prove of great benefit to surgery." It ought, however, to be said that he managed the material in a manner rather different from that which I have recommended. He cut the ligatures out of the whole thickness of the vessel lengthwise, stretched the bands half their length, and left them to dry. In operating "he threaded the needle with ordinary catgut, and by tying the flat ligature to this easily drew it beneath the arteries." Doubtless this mode of making the ligatures saves some time, but an unnecessary amount of common areolar tissue is introduced into the patient's body. To a cord cut in that direction the middle coat adds no strength.

chance of prolonging life; it failed however to do so, but I do not think it hastened death, which occurred thirty hours after from pneumonia.

The parts of my first named case, J. S—, are on the table, as also, by the kind permission of Dr. Hopkins, of the Cleveland Street Infirmary, are the aorta, aneurism, &c., of Dr. Lediard's patient, while of my last-named patient I have brought only part of one vessel and the ligatures used.

I will now describe the condition of things found in my patient J. S—, sixteen months and a half after operation.<sup>1</sup>

On the aorta are two aneurisms. A large one in front on the transverse aorta, and slightly involving the innominate, is filled with solid clot. Behind and springing from the ascending trunk is another aneurism, about the size of a walnut, exactly in the situation, where I, during the patient's life defined it from the peculiarly isolated pressure which bore on the right bronchus. The carotid of this man was the first vessel that I had tied with the aorta ligature, and it is clear that I tied it too loosely. The temporal pulse could be felt almost immediately after the operation; this I at the time attributed (but evidently by error) to freedom of collateral circulation. The ring of cellular tissue which the College of Surgeons' dissector has left on that vessel is probably the remains of the ligature.

On the subclavian, at the place of constriction, a few faint transverse striæ could be seen—the vessel is collapsed—it has been opened by a lengthwise slit in order to show the clot which fills it for a certain distance on each side the constriction. The collateral circulation is well established.

The description of parts from the next case I take from a letter addressed to me by Dr. Lediard:

"The aneurism is filled up with very firm clot. Nothing

<sup>1</sup> This preparation, which by the kind permission of Professor Flower I was able to bring with me, has since been placed in the College of Surgeons' Museum, Path. Series, No. 1596 D.

could have been more satisfactory than the action of your ligature in this case. The vessels were entirely occluded, there being no trace of the bands seen but a firm clot above and below the seat of constriction, such as is usually met with in vessels ligatured in their continuity."

The other specimens on the table, those of J. K—, are : —1. The part of the subclavian artery which was tied ; it is laid open to show the inner and middle coat entirely unhurt. 2. The ligature itself, which was divided in removing the parts. 3. The other ligature, kept with the knot entire in its tied condition ; it has been removed by dividing the vessel. Evidently there is no tendency of the knot to slip, nor of the ligature to become rapidly softened.

Certain other vessels have been tied with this ligature, viz. the external iliac twice, by Mr. Holmes and Mr. Johnson Smith. Both those aneurisms progressed well, and the surgeons reported to me very favourably of the ligature. Also, femoral arteries have been tied by Mr. Bellamy twice, by myself once, and one brachial also by me. In all these cases the wound did well, nothing more having been heard or seen of the ligature ; indeed, in the last four very rapid cure followed. In the brachial case the vessel was retied with ox-aorta after failure from rapid softening of catgut and secondary hæmorrhage.

Thus I am able to report to this Society fourteen deligations, which being varied, are more than sufficient to prove the solubility of the ligature which I introduced two years ago, and also to show that it is not absorbed too soon. Hitherto no instance of tying either the innominate or the first part of the subclavian has presented itself. I would wish, however, to repeat that the deligation of such large vessels so near the heart can only be safely undertaken with a ligature, which leaves all the arterial tunics entire and unwounded, a result only to be obtained by using a flat or ribbon-like band.

The specimens which I have placed on the table, six in number, especially the last described, show how the liga-

tures have acted. Let me very specially call attention to the fact that ox-aorta requires no preparation; it is simply cut, while fresh, into strips and dried; therefore all these ligatures are in their constitution alike. What these have done all others may certainly be expected to do.

I do not for one moment suppose that this power of absorption by the living human tissues is peculiar to arterial tunics, we know that all the soft connective tissues, as tendon and cellular membrane, possess this faculty, provided they are perfectly fresh, that is to say, not decomposed.

The extensor or suspensory tendon of the kangaroo's tail, tendons from the whale, decalcified bone from quadrupeds and birds, have all been introduced into the human body and have become absorbed or incorporated with the tissues. The (fibrous) structure which intervenes between the mucous and muscular coat of the sheep's intestine, the substance of which catgut is made, would doubtless act constantly and always in the same way were it not that a certain, or rather an uncertain, amount of putrefaction is essential in the primary manufacture; it is this that renders a long and elaborate preparation necessary,<sup>1</sup> and the ultimate result uncertain. To me the important points appear to be that the substance used should be absolutely free of all taint of decomposition, and that it should be cleansed from any accidental impurity by a short immersion in some antiseptic fluid. If these essentials be secured the choice of particular substance is immaterial; sufficient strength, persistency, ability to keep a safe knot, as also facility of acquisition, are the main considerations for an ordinary ligature. But for safe deligation of the larger arteries in continuity a flat form such as will not divide the tunics, is a great desideratum.

<sup>1</sup> That the preparation is not absolutely an essential may be gathered from the fact that of 80 unprepared catgut ligatures introduced experimentally by Porta 33, *i. e.* 41·25 per cent. were absorbed. ('Delle Alterazioni patolog. delle Arterie per la legatura,' &c.)





A CASE  
OF  
INNOMINATE ANEURISM  
TREATED BY  
SIMULTANEOUS DISTAL LIGATURE OF THE CAROTID AND  
SUBCLAVIAN ARTERIES;  
WITH REMARKS  
ON THE BEHAVIOUR OF A TENDON LIGATURE.

BY  
C. T. DENT, F.R.C.S.,  
ASSISTANT SURGEON TO ST. GEORGE'S HOSPITAL.

(Received February 8th.—Read March 22nd, 1881.)

THE patient, whose case is given below, was admitted into St. George's Hospital on April 26th, 1880, under the care of Mr. Pollock. I have to express my warm thanks to Mr. Pollock for kindly permitting me to publish the case.

The history, symptoms, and progress of this case of aneurism, and the operation undertaken for its cure will, I hope, be thought worthy the attention of the Society. Double distal ligature of the carotid and subclavian arteries, for the cure of thoracic aneurism, is an operation of sufficient rarity and importance to justify a detailed

account of any case where this somewhat formidable measure is adopted.<sup>1</sup>

On the history of the case however, and on the general results of the operative treatment, I shall touch but lightly, preferring to invite the attention of the Society to certain pathological points in connection with the ligature of the arteries with a peculiar form of ligature.

The history of the case is as follows:

Samuel L—, æt. 37, an engineer, had always been healthy up to the commencement of the disease for which he was admitted. His habits of life were active, and for many years he had been accustomed, as “first tenor” in a choir, to much singing. On occasions he had rather strained his voice, but never felt any ill effects for long. He had never suffered from syphilis. About twelve months previously, in April, 1879, he noticed some difficulty in producing his “chest notes,” as if there existed some obstruction, which was referred to the root of the neck. In October, 1879, he first felt pain about the neck and the sterno-clavicular joint. The pain though not severe was tolerably constant; three months later, some swelling was observed in the right sterno-clavicular region, which increased rather rapidly and occasioned much pain down the arms and in the back. From this time he began to lose strength and during the next three months, lost about eighteen pounds in weight. The breathing became affected, and the voice a little husky and stridulous; he was troubled also with a constant slight clearing cough, and with what the German physicians well term “Hustenreiz.”

When admitted, he was seen to be a tall, well-formed, rather spare man. His expression was rather anxious; the breathing was a little harsh, and the voice weak and slightly husky, but he had no severe dyspnoea.

The radial pulse was the same on both sides, regular and quiet.

<sup>1</sup> Mr. R. Barwell, in a paper read before the Royal Med. and Chir. Soc. in December, 1878, mentions eleven cases. (*Med.-Chir. Trans.*, vol. lxi, 1879.)

Over an area extending on the right side, from a little above the clavicle to the third or fourth rib below, and behind the sternum, was situated a moderately prominent, ill-defined, pulsating swelling, which gave the sensation of being deeply situated. The pulsation, however, had no expanding character, and the tumour was at first thought to be possibly a malignant mediastinal growth; there was no thrill to be felt, nor bruit to be heard; on auscultation the heart sounds were communicated with great distinctness to any part of the swelling. The carotids on the two sides pulsated equally. Some difficulty was experienced in swallowing dry food.

Complete rest in bed and large doses of iodide of potassium brought about a marked improvement. It appeared that the symptoms had previously been relieved by this drug. As, however, the pain and the difficulty of deglutition and breathing diminished, the swelling assumed more obviously the appearance of aneurism. From May 31st to June 10th his diet was limited to half a pint of milk and half a pint of beef tea daily, but without yielding any marked benefit. The improvement resulting from rest and the iodide did not last long, and by June 10th the swelling had become much more prominent and the pulsation more marked. The aneurism had increased upwards and displaced the sternal half of the clavicle forwards. A faint bruit was now audible posteriorly, on a level with the sixth dorsal vertebra.

On June 10th, Mr. Pollock tied the right common carotid above the omohyoid, and the third portion of the right subclavian artery. For the carotid a tendon ligature was employed; in tying the second knot, the ligature broke. The first knot sufficed to keep the loop firmly applied to the artery, but it was thought insecure to leave it so. Accordingly, a thick catgut ligature was passed round the artery and tied close to the tendon. The subclavian artery was secured with a flat tendon ligature only. Both arteries seemed perfectly healthy. The operation was not performed under the antiseptic system.

The effect on the aneurismal tumour was very marked immediately ; the clavicle sank back a little and its outline became more defined ; the pulsation distinctly decreased and the prominence below the clavicle diminished.

Two days later (June 12th) he had a severe attack of dyspnœa, lasting several minutes. The next day he again had a similar attack and became rather cyanosed. The attacks were thought to be due to nervous irritation ; opium was given, with the effect of markedly relieving the dyspnœa and distress. Four days after the operation the tumour had so much decreased, or the lung collapsed, that there was decided flattening on the right side over the first four ribs. Subsequently, similar flattening was observed on the left side, and later on a concavity in this situation. The respiratory movements of the thorax were very restricted and the abdomen in the epigastric region retracted ; the respirations were 42, and very laborious. During the next six days (up to June 18th) the symptoms rather increased, though at times he seemed to rally and was in comparative comfort. The attacks of dyspnœa then became more frequent, and the expression at times was one of terrible anxiety and distress. Finally, on June 20th, ten days after the operation, the breathing once more became very laboured ; the frequency of the respirations increased till they reached 52 ; the pulse grew weaker, and he died very suddenly.

The day after the operation faint pulsation could be felt in the radial pulse, but this disappeared again three days later. The temporal pulse on the right side was felt for the first time five days after the operation.

The temperatures of the two sides were carefully taken. The day after operation the temperature of the right ear was about one degree lower than the left ; by the fifth day they were nearly identical. In the axillæ the temperatures were almost exactly the same from the very first.

The post-mortem examination was performed by Dr. Isambard Owen, to whom I am indebted for the following notes and for the preparation of the dissection :—" Lungs,

emphysematous, more solid than natural; abundant, slightly purulent fluid exudes on pressure; some of the lobules are choked with yellowish material. The apex of the right lung is compressed by the aneurism.

"Heart uncontracted, filled with soft black clot; tissues healthy.

"The aorta is covered with large patches of atheroma. In the position of the orifice of the innominate artery is an opening, the size of a sixpence, with funnel-shaped edges. This opening leads into an aneurism of lobular form, about the size of an orange, situated behind the first piece of the sternum and rising above it. The aneurism is full of laminated clot. The sternum is eroded at one point, and the sterno-clavicular joint opened. At the level of the lower border of the first rib the anterior wall of the trachea is compressed by the tumour, and the tracheal wall is eroded completely through, the opening being the size of a threepenny-piece, and bounded by the out ends of the cartilaginous rings; the trachea thus communicates with the connective-tissue plane of the mediastinum, but there is no corresponding opening from the aneurism. The right subclavian and carotid rise from about half an inch of common innominate artery, from the right side of the aneurism."

The opportunity was thus accorded to me of examining the artery and noting the changes that had taken place at the seat of ligature in the course of ten days. On dissecting down to the carotid artery, I found that the deeper part of the wound was united. A very moderate amount of lymph had been effused in and about the carotid sheath. The knot of the ligature was completely buried, but a depression indicated its position. About an inch and a half of the artery was removed, together with the ensheathing lymph, and hardened in a mixture of chromic acid and spirit. On making a longitudinal section through the specimen, the appearance was shown which is most accurately indicated in the accompanying drawing (Plate III, fig. 2). The knot of the tendon ligature was seen at

the upper part in close contact with the artery, encysted in a small cavity in the effused lymph. The knot was almost gelatinous in appearance, but small, glistening, tendinous bands could be seen crossing the dark space. The vessel was completely occluded for a quarter of an inch, being represented by a cord of fibro-cellular tissue. A firm clot in close connection with the wall of the artery filled up the vessel on the distal side of the ligature. On the proximal side the clot was less well formed, and showed a tendency to break down in the centre.<sup>1</sup>

For purposes of microscopical examination sections were made in a longitudinal direction, including both ends of the obliterated artery and the knot of the ligature. Other sections were made in a plane at right angles to these through the knot, so as to show the ligature encircling the vessel. My best thanks are due to my colleague, Mr. W. H. Bennett, for making the sections, and to Mr. F. C. Compton for his care and skill in preparing and mounting the same.

In some of the sections the connection of the ligature with the artery was so slight that the two were separated either in cutting the section or in mounting the specimen. In many others, however, and even in very thin sections, the connection was much firmer, and a very slight, but still appreciable, amount of force was necessary in order to detach the knot of the ligature, or the tendon itself, from the vessel. The adhesion was about as firm as that of a skin wound uniting by first intention at the end of a few hours. To this point I shall return later on.

A considerable part of the tendon ligature, where not in immediate contact with the artery, was altogether unaltered. To the naked eye it seemed unchanged, and even under the microscope it was quite normal in appearance.

<sup>1</sup> Senfleben has asserted that an internal clot does not usually form when catgut ligatures are used (Virchow's 'Arch.,' lxxvi; 'Gaz. Hebdom. de Med. et de Chirurg.,' 1880, No. 20, p. 325). But this assertion has been altogether disproved by Dr. J. F. Arnaud, in an essay entitled 'Contribution à l'étude de la ligature dans le traitement des anévrysmes,' Paris, 1880.

No trace of the catgut ligature could be found. It is quite possible, however, when we look at the extent of artery obliterated in the case now under consideration, that the catgut ligature had contributed an important share towards the occlusion of the vessel. This quite accords with the results of Dr. Arnaud's experiments.<sup>1</sup> This observer ligatured the carotid and femoral arteries of dogs fourteen times with carbolised catgut. At the end of four days in one experiment, at the end of seven days in two, and at the end of nine in another, the parts were examined and no trace of the catgut could be discovered.<sup>2</sup>

On examining the sections under the microscope (see Plate II and Plate III, fig. 1), the following points are observable :

1. The external coat of the artery is not ulcerated. In this particular case it might be asserted that the breaking of the knot when the ligature was tied must have led to some relaxation of the ligature, and that, consequently, the non-ulceration proves nothing; but examination of the subclavian artery, which was also tied with a tendon ligature and on which the knot was still found firm, showed no ulceration of the external coat. I conclude, therefore, that the tendon behaves like other animal ligatures, notably catgut, and that slight softening and swelling of the ligature obviates any ulcerative action. A further and highly important explanation—to be further adverted to presently—would appear to consist in the fact that new blood-vessels are early developed in those parts of the tendon which lie close to the artery.

The action of the tendon ligature, therefore, resembles that of the catgut, in so far as it does not lead to ulceration of the external coat; but it may possibly differ from the catgut in that this effect is not wholly due to the softening

<sup>1</sup> Op. sup. cit.

<sup>2</sup> In other cases, however, 4, 9, and 11 days respectively, after the application of the ligature, the catgut was still distinctly recognisable, and in one instance, 16 days after the application of the ligature the catgut was found only softened and infiltrated. Op. cit., p. 25.



of the ligature. It has been asserted that blood-vessels develop in the catgut. That this at any rate is not always the case is proved by the occasionally early disappearance of the ligature.

2. The action of the tendon on the middle and inner coats of the artery is the same as that of any other ligature, that is to say, these coats are ruptured in places, and their inner walls lie in contact.

3. In some of the sections the tendon ligature is seen to be most closely connected with the artery, and but for the differentiation of the tissues by the staining fluids, the artery could hardly be distinguished from the contiguous ligature. Still, there is no evidence of destruction of the arterial coats, though they are compressed by the ligature.

4. In places where the tendon lies in close connection with the artery it was infiltrated with small, round, granulation cells or leucocytes. The cells, which are readily stained by logwood, have penetrated into the interfascicular spaces, and tend to split up the tendon into longitudinal bands. Close examination of these parts reveals the presence of what I cannot but conclude are newly developed blood-vessels. Round and about these vessels the cells are numerous, and show a tendency to elongation (see Plate III, fig. 1); the latter change has been described by numerous observers (O. Weber,<sup>1</sup> Bubnoff,<sup>1</sup> Szuman,<sup>1</sup> Senftleben,<sup>2</sup> Billroth,<sup>3</sup> and others) as preliminary to the formation of blood-vessels in the clot itself.

Several objections may be raised against the supposition that these vessels seen in the specimens are newly formed. For instance, they present a somewhat different appearance to newly developed blood-vessels elsewhere, such as can be seen in the tadpole's tail, or such as have been recently described by Tillmanns<sup>4</sup> and beautifully figured in his work. But here the conditions under which the blood-

<sup>1</sup> Quoted by Arnaud, *op. cit.*, p. 48.

<sup>2</sup> *Op. jam. cit.*

<sup>3</sup> 'Surg. Path.,' Hackley's transl., 1877, p. 113.

<sup>4</sup> Tillmanns, "Experimentelle und anatomische Untersuchungen über

vessels developed were totally different from those in the case under consideration; the process is more analogous to one form of the development of blood-vessels in granulations which Billroth<sup>1</sup> and others have described.

Secondly, it might be thought that these blood-vessels are merely those normally found in tendon. This view I think is altogether negatived by two facts; one is that in parts of the tendon remote from the artery absolutely no blood-vessels can be found. The second is that numerous cells are found in the neighbourhood of the new vessel besides those which directly contribute to its formation; an appearance quite different from that of a blood-vessel which has existed for any length of time. Finally, it may be said that the development of blood-vessels is astonishingly rapid, considering that the ligature had only been *in situ* for ten days. It may be so; if the answers to the other objections are deemed satisfactory, this last difficulty falls to the ground.

5. In one or two of the sections it appears possible to trace blood-vessels which pass across the line of connection and extend into the artery on the one hand, and into the tendon on the other.

6. The different behaviour of the infiltrating cells towards different tissues is well illustrated by some of the specimens in which some muscular tissue, which was probably adherent to the ligature, is seen surrounded by numerous granulation cells. The muscular bundles are being attacked and eaten away. No giant cells can be distinguished at this part, as might possibly have been expected.

Such are some of the points observed under the microscope in these specimens. It is far from my intention to draw any decided conclusion from a single case, or to assert that the tendon ligature is more reliable than even ox-aorta ligatures, of which Mr. Barwell speaks so favourably,

Wunden der Leber und Nieren," Virchow, 'Arch.,' 1879, Bd. lxxviii, Heft 3, p. 437.

<sup>1</sup> "Untersuchungen über die Entwicklung der Blutgefäße;" Berlin, 1856. Quoted in Paget's 'Surg. Path.,' p. 160.

or chromic catgut, as recommended by Dr. MacEwen<sup>1</sup> and Mr. Lister.<sup>2</sup>

Acupressure has shown that it is quite sufficient to occlude an artery for forty-eight hours. For my own part I fail to see any great force in the objections urged in many quarters and by good authorities against catgut, even though this material may dissolve or soften at an early period. Still, those who mistrust the catgut ligature may be satisfied with an animal material which requires less preparation and is more constant in its behaviour when in contact with living tissues. I do not venture to assert at present that in tendon we have a ligature fulfilling these conditions; nevertheless, I trust that the subject may be thought worthy the attention of those who take an interest in the still unsettled questions connected with the ligature of arteries.

It will of course be understood that in this paper no priority at all is claimed in the use of a tendon ligature. In the 'Clinical Trans.' for 1878, vol. xi, p. 103, the late Mr. G. W. Callender suggested the possible value of the material in the course of some remarks on tendon ligatures; these tendons were, like those employed in this case, taken from the tail of a marsupial, and were supplied to Mr. Callender by Mr. J. M. Girdlestone, of Melbourne. Other references to the use of tendon ligatures will be found in the 'Australian Medical Journal' of December 15th, 1879, and in the 'London Medical Record' of April 15th, 1878. But the material has been, I believe, often used before by the older surgeons, though perhaps no such good opportunity has previously occurred as fell to my lot in the present case of ascertaining its exact mode of action on an artery.<sup>3</sup>

<sup>1</sup> 'British Med. Journal,' vol. i, 1879, p. 272, and Sept., 1878, p. 359.

<sup>2</sup> Lister, "On Chromic Catgut Ligature," 'The Lancet,' Feb. 5, 1881.

<sup>3</sup> Copious references to the literature on the subject of this paper will be found in an essay by Dr. Fritz Raab, entitled "Ueber die Entwicklung der Narbe im Blutgefäss nach der Unterbindung," Langenbeck's 'Arch.,' vol. xxiii, 1879, p. 156.



DESCRIPTION OF PLATES II AND III,  
Innominate Aneurism treated by Distal Ligature of Carotid and  
Subclavian Arteries with a tendon ligature (Mr. C. T. Dent).

---

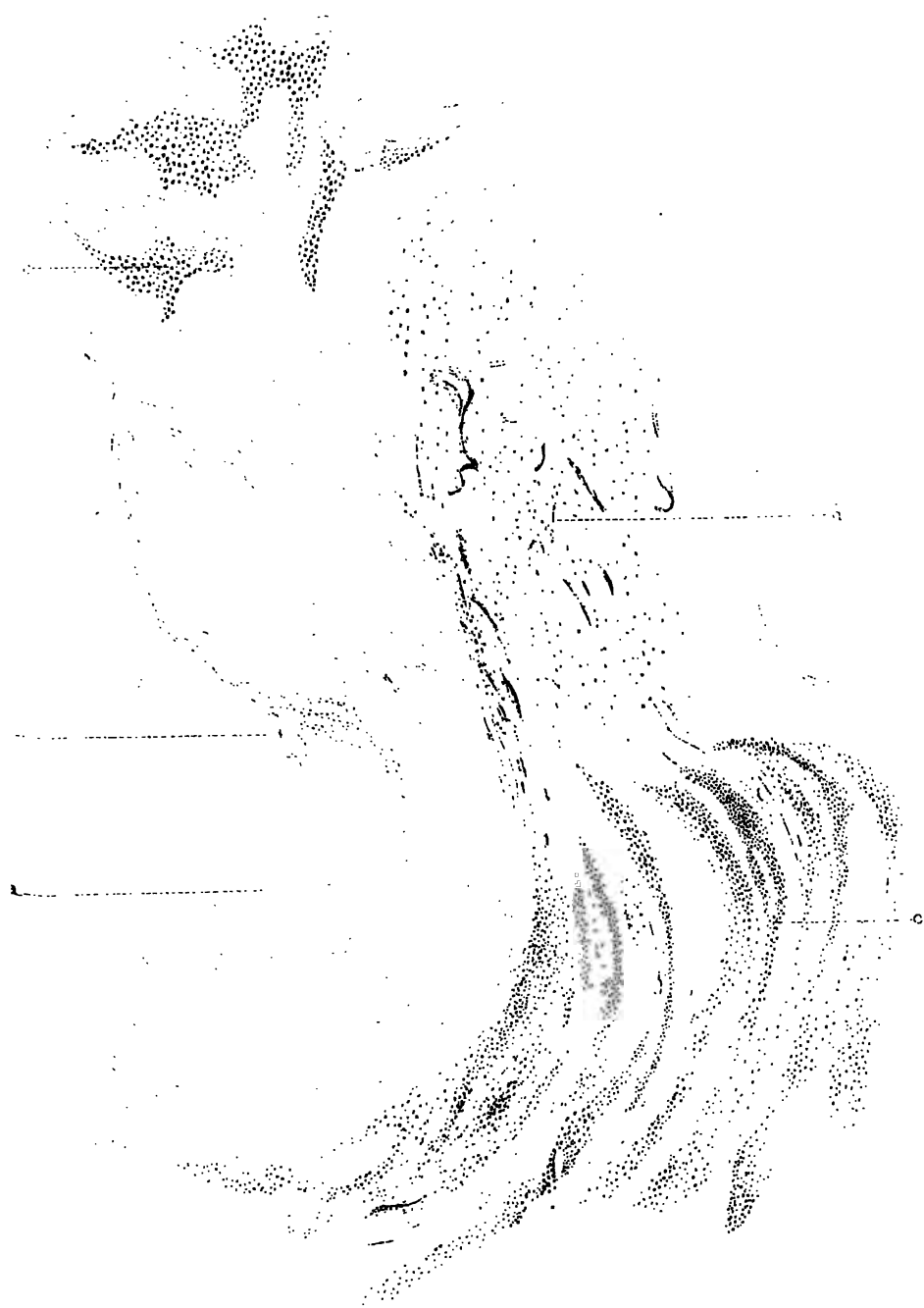
PLATE II.

Transverse section of artery showing tendon ligature *in situ*,  
× 45. *a.* Carotid artery. *b.* Lumen of artery. *c.* Shows rupture  
of inner coats. *d.* Tendon. *e.* Infiltration of small cells splitting  
up tendon into longitudinal bands.

PLATE III.

FIG. 1.—Shows elongation of cells, and development of new blood-  
vessel in the tendon. × 200.

FIG. 2.—Twice natural size. Longitudinal section of artery show-  
ing ensheathing lymph and tendon ligature *in situ*. The vessel  
is completely occluded. The clot is less perfect on the proximal  
than on the distal side of the occlusion.



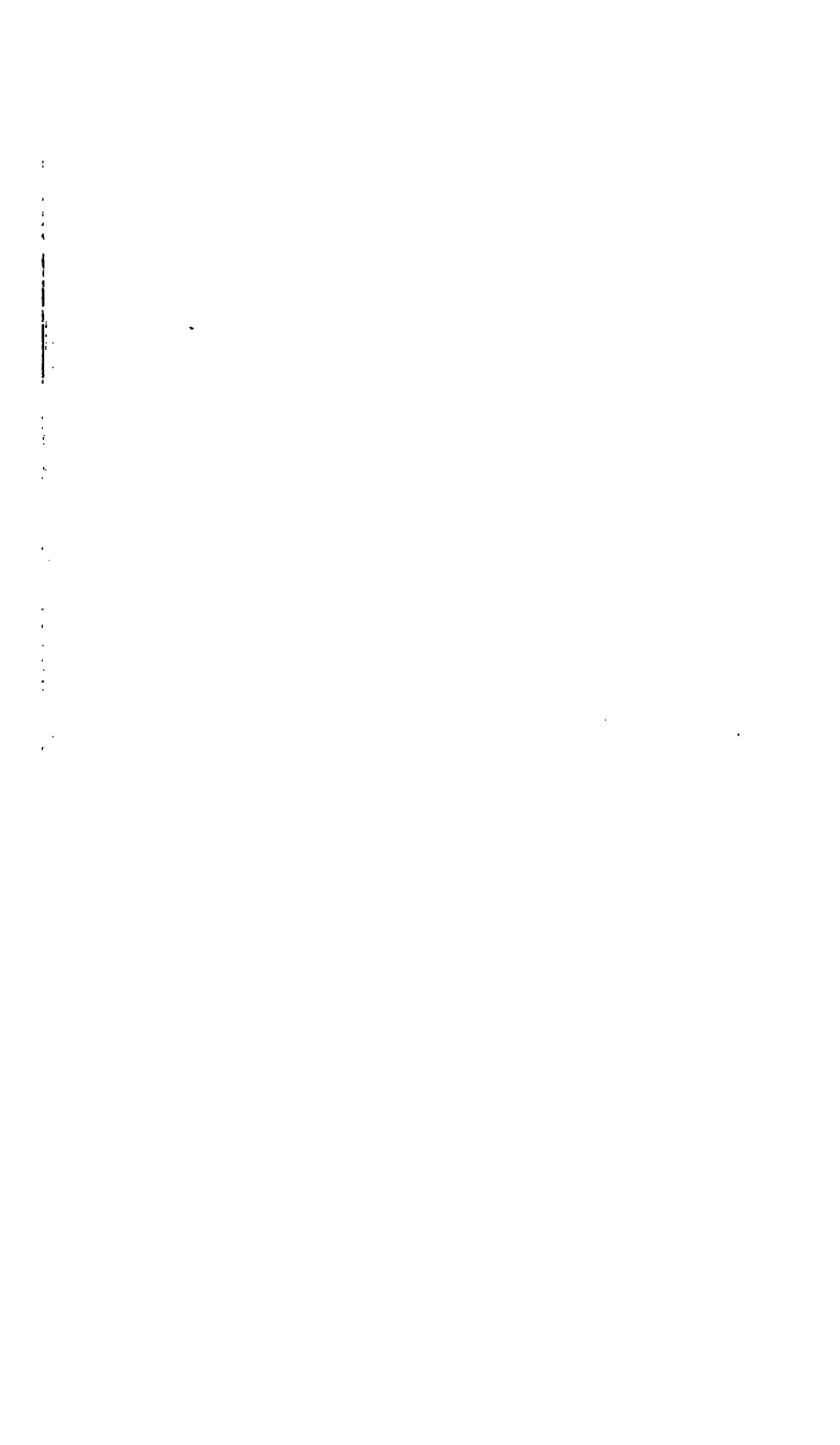


Fig. 1.



Fig. 2.





1

2

ON THE DEVELOPMENT  
OF A  
LAYER OF ELASTIC FIBRES  
IN  
DUCT CANCER OF THE BREAST.

BY  
GEORGE THIN, M.D.

---

Received January 14th—Read February 23rd, 1881.

---

I SUBMITTED to the Society during the last session a paper which dealt with histological changes found in several cases of cancer of the breast. In connection with one of these cases a new formation, of what I termed "an elastic substance composed of a fine fibrillar element," around some masses of cancerous epithelium was described. Since that paper was read I have continued my examination of this substance, and have now to bring before the Society a short summary of the results of a more mature study of its nature and significance.

Although a scanty development of this layer is not unfrequently observed in tumours of the kind with which my previous paper dealt, I have not found in any which I have examined the formation to so large an extent as in the tumour in connection with which my first study of this substance was made. It is, therefore, on data

supplied by a further examination of the same tumour that the following conclusions have been arrived at :

The tumour referred to is an example of the growth to which Waldeyer has given the name of fibro-carcinoma cysticum mammæ, and which I have described as duct cancer.

The new formation is not present in all the epithelial masses, and is found most developed in those which are situated in the central and deeper parts of the tumour. This "elastic substance" is simply a layer of minute elastic fibres which surrounds the cancerous epithelium, and from which it is separated by a *membrana propria*. It is absolutely free from admixture with white fibrous tissue, often attains considerable thickness, and when examined under a low magnifying power is seen to be sharply demarcated from the fibrous tissue on its outer side. Under a high power the minute elastic fibres can sometimes be seen to be continuous with elastic fibres in the surrounding tissue. It contains leucocytes and a few capillary blood-vessels.

All the elastic fibres composing it are minute, and they interlace in different directions.

So far as I am aware the existence of a similar layer of elastic fibres has not been previously described. In the present instance it was well brought out by the characteristic effects of picric acid and eosin.

Its significance seems to me to be as follows :

Henle has described an elastic layer as surrounding the large lactiferous ducts—a layer which appropriate staining makes very conspicuous. It is impossible not to associate the development of Henle's layer around the ducts with the development of the duct epithelium. Tumours like that in which I found the elastic layer largely developed as a new formation, have been traced by Waldeyer and others (and I can confirm the observation) to an epithelial growth which originates in the ducts ; and the inference follows that there is an intimate connection between the growth of epithelial masses of duct origin and

the formation of the new layer of elastic fibres ; that there is a repetition in the cancerous growth of an impetus to the formation of elastic tissue similar to that which produces the elastic layer of Henle ; and that in both instances there is a connection, which is yet unexplained, between the growth of a columnar epithelium and a growth of elastic tissue.

The *membrana propria*, surrounding some, but not all, of the cancerous masses, was found chiefly around the large ones. It was nucleated and occasionally a double line of nuclei, one on each side of the membrane, was observed. This *membrana propria* was of new formation, and its mode of distribution in this tumour illustrates the misleading nature of the proposal to make its presence or absence the criterion of a growth in any given instance being a so-called adenoma or a cancer.

#### DESCRIPTION OF PLATE IV.

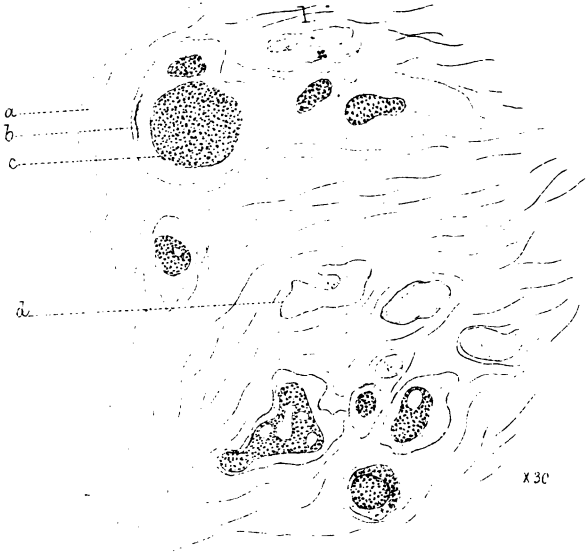
Development of a Layer of Elastic Fibres in Duct Cancer of the Breast. (Geo. Thin, M.D.)

FIG. 1.  $\times 30$ . *a*, white fibrous tissue; *b*, layer of elastic tissue; *c*, cancerous epithelium; *d*, portions of the elastic layer shaved off the borders of the cancer-masses in making the sections.

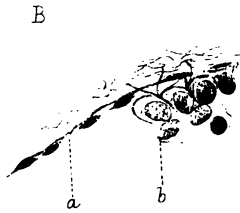
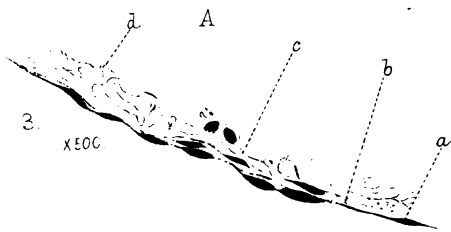
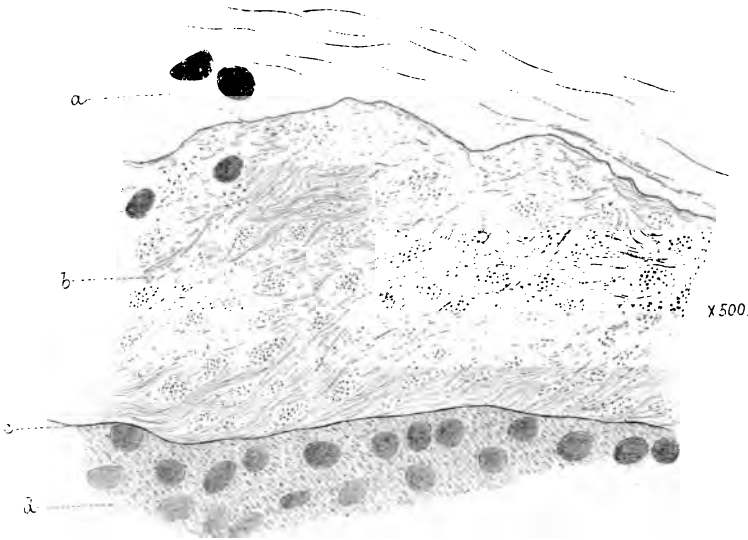
FIG. 2.  $\times 500$ . *a*, white fibrous tissue; *b*, layer of elastic fibres; *c*, membrana propria; *d*, cancerous epithelium.

FIG. 3.  $\times 500$ . (A and B show different parts of a large portion of the membrana propria which was isolated as an accident of the preparation. The part A is continuous in the preparation with B, but in the drawing an intervening portion is left out.)

- A. *a*, nucleus of the membrana propria; *b*, membrana propria;  
*c*, nucleus on the outer side of the membrana propria;  
*d*, elastic fibres, portion of a large elastic layer from which the membrana propria has been partly detached.
- B. *a*, membrana propria; *b*, cancerous epithelium.



2.





CASE  
OF  
VASCULAR PROTRUSION OF THE  
EYEBALL.

BY  
CHARLES HIGGENS, F.R.C.S.E.,  
OPHTHALMIC ASSISTANT SURGEON TO GUY'S HOSPITAL.

---

(Received February 14th—Read April 12th, 1881.)

---

(Report by Mr. PERKINS, Dresser in the Eye Ward.)

CHARLOTTE H—, æt. 42, widow, a charwoman; admitted to Guy's Hospital March 3rd, 1880.

*Family History.*—Does not know much about her relations. Her father died thirteen years ago, æt. 45, from an abscess (?) in the front of the chest, for which he was operated on in St. Bartholomew's Hospital, and died three days after the operation.

*Personal History.*—Patient had rheumatic fever and dropsy two years ago; has had sore and ulcerated throat, no other history of syphilis. Denies excess in alcoholic drinks, but has the appearance of—and probably is—an inveterate drinker.

*History of present illness.*—About six months ago first noticed that she was becoming rather deaf in the left ear, and began to perceive a ticking like a watch in the same ear. The ticking has continued and the deafness has increased.

About four months ago had an attack of inflammation in the left eye, she then noticed that the sight of that



eye was impaired, believes it had previously been good. The sight of the left eye has grown gradually worse, and during the last month the right eye has failed slightly. Has noticed the left eye "increases in size" during coughing, stooping, or straining in any way. Two months ago noticed that left eye was permanently more prominent than the right; the prominence has gradually increased, but more slowly of late than at first. Gives no history of any blow or fall on the head.

*On admission.*—Patient is a stout, strong-looking woman; face rather bloated, showing a good deal of capillary congestion especially about the nose.

The left eye is pushed straight forward as if by a tumour directly behind the globe, the lids can be closed over it; the upper lid is puffy and swollen. Nearly the inner half of the lower eyelid is occupied by an elastic strongly pulsating tumour, evidently a greatly dilated blood-vessel. The conjunctiva is vascular and œdematous; the blood in the distended vessels is dark coloured and apparently venous. The protrusion of the eyeball is increased by stooping or coughing, its movements are but little interfered with; there is no diplopia. Vision of left eye =  $\frac{1}{2}$ , of right eye  $\frac{1}{3}$ . The pupils are equal, but the action of the left is rather sluggish. The ophthalmoscope shows venous congestion of the retina. Patient complains of no noises in the head beyond the ticking in the left ear already referred to.

Beyond the swelling in the lower eyelid, no tumour can be felt in or about the orbit; there is marked pulsation beneath the upper eyelid close to the inner canthus. A loud, whirring, systolic bruit, can be heard over the whole head, but is especially loud over the centre of the left parietal bone, and closed eyelids of the left eye. The bruit entirely ceases and all pulsation is stopped by pressure on the left common carotid.

Mr. Purves examined the patient's ears and reported as follows:

Left ear: hearing 6" by watch. Hearing by fork on

mastoid normal. Drum fallen in so that incus end is seen against inner side. Excursion of drum especially at lower and anterior part excessive. The drum is permeated by numerous capillaries. The cavity contains exudation. The bruit is heard by the tube in the meatus better on the left than on the right side, synchronous with pulse.

The patient was put on low diet, kept lying down the greater part of the day with an ice-bag applied to the head; the bowels were kept freely open.

April 15th.—All the symptoms were aggravated. The patient was placed under the influence of an anæsthetic (alcohol, chloroform, and ether mixture). Mr. Higgins ligatured the left common carotid immediately above the omo-hyoid muscle. There was no difficulty about the operation, a silk ligature was used and its ends left hanging out at the lower extremity of the wound, which was closed with very fine silk sutures and covered with a piece of dry lint and large pad of cotton wool, secured by strapping and bandage. On tying the ligature the left side of the face became blanched, the distended conjunctival vessels empty, all pulsation ceased, and the bruit became inaudible; there was no change in the pupil, no convulsion or paralysis.

16th.—Patient feeling very well, has passed a fair night, but did not sleep much. Eye much less protruded, no bruit to be heard, no pulsation, ticking in the ear continues; no hemiplegia or loss of sensation, complains of frontal headache, and is rather troubled by cough and slight bronchitis, which she has had off and on for years. Temperature  $98.3^{\circ}$ , pulse 90, morning. Temp.  $98.4^{\circ}$ , pulse 84, respirations 17, evening. Ordered Pot. Bromide gr. x, Mist. Cascarillæ co. 3j, ter die.

17th.—Temperature and pulse normal, headache continues, no bruit or pulsation. Slight loss of motion and sensation in right arm; she moves the arm slowly and feebly, and sensation though slightly is decidedly diminished. The left leg is unaffected. The wound was dressed; all but the lower part occupied by the ligature had healed by primary union. Face rather flushed.

18th.—Headache better; has ice-bag applied to head. Face less flushed. Right arm can be moved better and its sensation is nearly normal. No bruit or pulsation. Four or five times during the night noticed numbness in the right hand; she got rid of it by shaking. Morning, temp.  $98.2^{\circ}$ , pulse 104, resp. 22. Evening, temp.  $98.3^{\circ}$ , pulse 100, resp. 17.

19th.—Not so well this morning, seems weak and complains of intense headache, cannot bear the weight of the ice-bag. There is neither bruit nor pulsation. The right arm is completely paralysed, it lies motionless on the bed, she cannot even move the fingers; sensation is slightly diminished. The movement of right leg is slightly affected. The paralysis comes and goes, she is much better for a time then worse again. Patient did not sleep well last night; yesterday afternoon was feeling very faint, and last evening the hemiplegia became worse and has not decreased much since; the leg was flexed and the arm slightly so. This evening, temperature of left side is  $98.6^{\circ}$ , whilst that of the right is  $100^{\circ}$ , so that the paralysed side is nearly a degree and a half warmer than the unaffected side. Pulse 104, respirations 22. Feet and hands are cold, the right foot is a little contracted, the arm not, the face is unaffected; there is some difficulty of speech, no aphemia.

Wound dressed, some of the sutures removed. Ordered hot-water bottle to feet, evaporating lotion to head, strong beef tea; to have twenty grains of chloral at night if necessary.

20th.—Passed a good night, is feeling and looking much better, no flushing of face, headache much less, extremities warm; sensation in arm and leg normal, can move leg fairly well, but slowly; arm completely paralysed, no contraction present, no difficulty of speech. The eyeball has returned to its normal position. The temperature of the right side is still about a degree and a half higher than the left (right  $101.1^{\circ}$ , left  $98.7^{\circ}$ ).

The next day, April 21st, the paralysis of both right

arm and leg, so far as motion was concerned, was complete. The wound was dressed and looked well. There was no headache, no pulsation in facial or temporal arteries, and no bruit could be heard (temperature, right  $100.2^{\circ}$ , left  $98.6^{\circ}$ ).

On the 23rd there was an attack of conjunctivitis in the left eye, the skin around the wound looked red; the remaining sutures were removed, and *Haust. Sennæ*  $\mathfrak{zj}$  given. There was little change for the next two days. The temperature was not taken after the 25th, at which date there was but little difference between the two sides, that of the paralysed side being, however, rather higher than that of the non-paralysed side (left temperature  $98^{\circ}$ , right temperature  $98.4^{\circ}$ ).

26th.—Patient feeling much better, the conjunctivitis of the left eye has subsided; can move all the fingers of the right hand and can lift the right leg off the bed; still complains of the ticking in the ear; wound entirely healed excepting the portion of it occupied by the ligature; there is neither pulsation nor bruit. The paralysis went on rapidly improving. On May 8th the right arm and leg could be moved as well as their fellows of the opposite side; the grip of the right hand, however, was not quite as strong as that of the left. On May 12th there had been occasional slight paralytic attacks on the right side which lasted a short time and then passed off. It was noticed that the left pupil was smaller than the right.

On May 18th (the thirty-fourth day since its application) the ligature came away.

24th.—Some bleeding from wound yesterday; it was, however, easily controlled by pressure with pad and bandage, and did not recur.

31st.—Pupils unequal. Slight pulsation can be felt in facial, temporal, and supraorbital arteries.

June 5th.—Patient up and about the ward, feels well, but rather weak; has had no more attacks of paralysis; the right arm and right leg are not quite so strong as the left arm and leg; can walk well. Pupils equal in size; some

large, tortuous, and dilated veins in conjunctiva of left eye; no protrusion of eyeball. Wound healthy and nearly healed. Some pulsation in temporal, facial, and supra-orbital arteries, and in the dilated vessel in the lower eyelid. Patient's hair, which on admission was nearly black, is now quite grey, and greyer on the left side than on the right.

11th.—Left the hospital.

14th.—Left pupil rather smaller than right, veins of retina full, some large veins in conjunctiva; eyeball slightly more prominent than its fellow. No bruit can be heard. Grip of right hand as strong as that of left. Left pupil dilates fully with atropine.<sup>1</sup>

*Remarks.*—The name, "vascular protrusion of the eyeball," is that adopted by Mr. Nunneley, and seems to commend itself because it does not refer to any one particular symptom, or to any special pathological change; it merely states that protrusion is due in some way to the condition of the blood-vessels.

The whole subject has been so thoroughly exhausted by Mr. Rivington in his paper on "Pulsating Tumours of the Left Orbit," published in the fifty-eighth volume of the 'Transactions' of this Society, that beyond making a few remarks on my own case and giving short abstracts of two cases published since the date of Mr. Rivington's paper, I find nothing left to record.

In my case the disease was probably of spontaneous origin; its progress was very gradual, and at no time were there any of the violent symptoms mentioned in many of the reported cases. In spite of the very loud bruit the patient did not complain of distressing noise in the head. She merely mentioned a ticking in the ear, which was probably not connected with the cause of the protrusion of the eyeball, at any rate it continued after all the other symptoms had disappeared.

<sup>1</sup> The patient remained perfectly well and was shown in the Museum of the International Medical Congress on August 9th, 1881, at which time it was hard to tell which had been the affected eye; no sign of paralysis remained.

The cause of the hemiplegia is not very evident. It commenced on the second day after ligature of the carotid, was partial and varied from time to time, but became complete on the sixth day and remained so till the twelfth, when it began to pass off, and had disappeared entirely by the twenty-fourth day. It could not have been due to cutting off of blood supply, or it would have appeared immediately; neither could softening of the brain have caused it, it made its appearance too soon and passed off too quickly and completely. It seems more probable that some serous effusion took place, which afterwards became absorbed.

The following are short abstracts of two cases published in the 'American Journal of Medical Sciences,' January—April, 1876 and 1877.

The first, by Dr. Morton, surgeon to the Pennsylvania Hospital, is headed "Supposed intracranial aneurism, ligation of the common carotid artery; death; autopsy."

*History, &c.*—Female, æt. 23; left orbit. While walking along a country road was seized with sudden, sharp, darting pain in left temple. The pain soon recurred, and became agonising. In the evening there was sickness, whizzing noise in left side of forehead and temple, and swelling of the tissues of the orbit. Next morning the eyeball was so prominent that the lids could not be closed over it. The vision was much impaired, and lost in forty-eight hours after first seizure.

*When first seen.*—Left side, extreme exophthalmus; eyeball fixed and motionless. A loud aneurismal bruit heard over left side of head, especially in temporal region and through eyeball. No pulsation perceptible; pressure on left carotid controlled bruit. Incision made in conjunctiva, orbit explored with negative results. Cornea sloughed.

Seven days after the patient was first seen, and fifteen from first onset of disease, the left common carotid was ligatured. The bruit ceased at once; the exophthalmus speedily subsided. The patient died rather suddenly on the following day.

*Post mortem*, made under unfavorable circumstances, showed no trace of aneurism. The anterior portion of the left hemisphere of the brain was softened at its under surface, with marked evidence of recent inflammation. All the nerves and blood-vessels entering the sphenoidal fissure were firmly glued together by recent lymph. The venous trunks in the locality were greatly distended with firmly clotted blood. The left internal carotid was normal. On the right side the sinuses were free from clot, but the right internal carotid showed a slight enlargement at the point of giving off the middle and anterior cerebral vessels.

The second case is by Dr. Frothingham, Professor of Ophthalmology, University of Michigan, and is headed "Pulsating tumour of orbit resembling true aneurism; ligation of common carotid; subsequent removal of tumour; recovery."

*History*.—Female, æt. 35; left orbit. Left eyeball becoming gradually more and more prominent for three years. No pain or serious discomfort at first.

*When first seen*.—Eye much protruded, moved perceptibly with each pulsation. Loud bruit heard over temple and eye. Compression of common carotid stopped the bruit and pulsation and allowed the eye to recede somewhat into the orbit. A soft, elastic, pulsating tumour could be felt on pressing the finger into the orbit at its outer angle. The eye could see well enough to allow the patient to distinguish the features of persons at several feet distance. True aneurism diagnosed. Compression was tried without success; subsequently the common carotid was ligatured. The immediate effect of the operation was to cause cessation of the bruit and pulsation, and considerable diminution in size of the tumour. The pulsation returned to some extent in fourteen days. Giddiness and cerebral symptoms for several weeks.

More than three years later there was considerable increase in the size of the tumour, which could be felt

projecting far beyond the lower margin of the orbit, and was now diagnosed as aneurism by anastomosis. Two months later eyeball and tumour removed. Patient recovered rapidly from the operation and returned home fourteen days after.

The tumour consisted of two portions; a dense portion and a mass of convoluted and sacculated vessels, held together and connected to the more solid portion by connective tissue. The more solid portion differed from the other in having a greater quantity of more dense connective tissue. It was permeated freely by blood-vessels, and in structure appeared much like a sponge.





# NEPHRECTOMY BY LUMBAR SECTION.

BY

ARTHUR E. BARKER, F.R.C.S.,

ASSISTANT SURGEON TO, AND ASSISTANT PROFESSOR OF CLINICAL SURGERY  
AT, UNIVERSITY COLLEGE HOSPITAL.

---

(Received March 22nd—Read April 12th, 1881.)

IN a paper which I had the honour to present to this Society last year, a case of "Nephrectomy by Abdominal Section" was described, which I had recently performed for a malignant growth of the kidney. In that communication some conclusions were hazarded which I ventured to think might be fairly drawn from experience of the operation in question, together with a careful study of all the other cases hitherto recorded (28 in number) collected from different home and foreign sources and appended. In expressing these conclusions and opinions I was in hope that service might be rendered to others who should thereafter feel called upon to perform this operation, the consideration of which, being a new procedure in this country, had required much time and labour. This operation is still on its trial, and it is quite as desirable that its dangers and weak points should be thoroughly well known as that its benefits and strong points should be brought out. Feeling this, I now place two other cases before

the Society, which, though they have unfortunately proved fatal, illustrate some of the difficulties to be overcome. They also show to some extent how this is likely to be accomplished.

But before describing the cases themselves, I may perhaps be allowed to allude to what has been done in this branch of surgery since the paper referred to was published in the 'Transactions' of this Society. I now lay before you a second table containing twenty-six new cases collected from a number of sources. These, added to the twenty-eight recorded in my first paper, make up a total of fifty-four cases of attempted or completed nephrectomies, designed or undesigned. This number it will be seen includes one or two operations which can hardly be said to have been completed, but which must be included in estimating the gravity of the procedure, since the aim of the surgeon was the removal of the kidney. But though the number of these operations now presented to us is considerable, we must not draw our conclusions from a mere numerical examination of the results. When a much larger number of cases has been fully and accurately recorded, a rigid statistical analysis can be made.

The records of the last series have been generally much more ample than those of the first, and therefore much more valuable.

Examining the list before you, the following points of at least general interest may be noted :

Out of the total of 28 cases tabulated in last year's communication it will be seen that 14 recovered and 14 died. But, excluding 6 cases in which the operator's original design was not nephrectomy, that 13 recovered and 9 died.

Out of the present 26 cases since collected, 12 recovered and 14 died, or, again, excluding 5 cases where nephrectomy was not originally intended, of the 21 remaining, 11 recovered and 10 died.

The causes of death in these 10 cases range themselves as follows:—Shock and collapse 3, uræmia 2 (in 1 of

these complete destruction of the remaining kidney was found to be the cause), hæmorrhage after operation 1, pyæmia 1, wound of pleura with immediate pulmonary collapse 1, vomiting and exhaustion 1, thrombosis of the pulmonary artery 1.

Of the 4 deaths, where the operator's original intention was not a nephrectomy, 3 were from peritonitis, and 1 from hæmorrhage at the operation.

Turning to the successful cases, it need only be noted that recovery is specially described as being complete in 7, slow in 3, no note on this point in 1, and 1 case is still in hospital.<sup>1</sup> In none of these successful cases were any marked uræmic symptoms observed. And, indeed, in only two of the unsuccessful cases do we find such. But in these two patients the remaining kidney was found to be completely destroyed by disease in 1, and in the other the liver and remaining kidney were in a state of advanced fatty degeneration. Again, among the recoveries marked shock is only noted in 1 case. Finally, of the 11 designed nephrectomies which were successful, 7 were lumbar and 4 ventral sections. To the latter might be added that 1 successful case where removal of the kidney was not the primary object of the operation (No. 35).

Of the 14 fatal cases, 7 were lumbar 7 ventral sections, or, excluding the same class as above, of the 10 remaining, 7 were lumbar and 3 ventral.

Combining now the tables of last year and the present, the following facts come out :—Of 54 cases of removal of the kidney, 26 have recovered and 28 died. Deducting, however, 11, where the operator's original purpose was not nephrectomy, there remain 43, of which 24 recovered and 19 died.

Of these 24 recoveries, 16 were lumbar and 8 ventral operations. To the latter might be added two other successful cases (Nos. 12 and 35), excluded because originally undesigned.

Out of the 19 deaths, 11 were lumbar and 8 ventral

<sup>1</sup> Now quite recovered (October, 1881).

operations. To the latter might be added 9 excluded for the above reason.

	<i>Deaths.</i>				<i>Recoveries.</i>				<i>Total.</i>
	1st Table.	2nd Table.			1st Table.	2nd Table.			
Lumbar	4	7	=	11	9	7	=	16	27
Ventral	10	7	=	17	5	5	=	10	27
	<u>14</u>	<u>14</u>	=	<u>28</u>	<u>14</u>	<u>12</u>	=	<u>26</u>	<u>54</u>

Excluding all cases not commenced with the aim of nephrectomy :

	<i>Deaths.</i>				<i>Recoveries.</i>				<i>Total.</i>
	1st Table.	2nd Table.			1st Table.	2nd Table.			
Lumbar	4	7	=	11	9	7	=	16	27
Ventral	5	3	=	8	4	4	=	8	16
	<u>9</u>	<u>10</u>	=	<u>19</u>	<u>13</u>	<u>11</u>	=	<u>24</u>	<u>43</u>

The kidney, then, has been removed twenty-seven times by lumbar section with 11 deaths, and twenty-seven times by ventral section with 17 deaths.

These numbers, however, do not convey a correct idea of the relative danger of the two procedures, for it would be manifestly wrong to include those cases in our calculation where nephrectomy was not the original object of the operation, which all range themselves with the ventral sections. If these, 11 in number, be excluded, our total of ventral operations is 16, with 8 recoveries and 8 deaths.

But, as far as numbers go, these figures show about 59½ per cent. of recoveries with lumbar nephrectomy, and 50 per cent. with the ventral operation.

Judging now from a larger number of records than was available last year, from three cases of my own, and from two others which I have witnessed, my own conclusion is that nephrectomy by abdominal section will eventually be found as useful and as successful as that from the loin. What we want to know now is which cases are suitable for the one and which for the other procedure. But this cannot be determined until we possess much more knowledge of, and power of distinguishing between, the different

morbid conditions, not only within but also surrounding the kidney. There are, for instance, certain cases in which the organ is embedded in a dense mass of inflammatory perinephritic tissue, too tough to allow of our isolating the structures of the pedicle or of tying them effectually *en masse*, and too vascular and widely connected to admit of its being removed in part or as a whole with the kidney. In such cases this operation ought not to be attempted. But, as yet, we have very slender objective or subjective evidence on which to base a diagnosis as to whether such a stage has been reached as yet or not in the perinephritic structures.

The two case I have recently operated on bear on these points.

CASE 2 (No. 45 in Table).—Mrs. H—, æt 32, admitted into University College Hospital under Dr. Wilson Fox, on June 16th, 1880. Has been married twelve years, but never pregnant. Has lived in healthy situations; temperate; family history good, both parents alive. Patient has generally enjoyed good health, but since she was five years old has from time to time suffered from left renal colic; is not able for more than slight exertion. The renal pain has been decidedly worse since marriage, and she has felt increasing languor and weariness.

On May 18th, 1880, she first noticed a tumour in the left renal region, about the size of an orange, her pain and weakness increasing. Since then the swelling has enlarged with great rapidity, and has nearly doubled its volume within the last fortnight, which has been spent in hospital.

*Present state.*—Complains of pain in left renal region, and much lassitude. Tumour felt in left lumbar, hypochondriac, epigastric, and even part of inguinal and umbilical regions. It is extra-pelvic, freely movable by palpation and on respiration; it measures transversely fourteen, and obliquely downwards and forwards fourteen and a half inches. Outline seen as well as felt through abdominal walls. Tumour smooth and fluctuating, outline

rounded. Percussion note dull from anterior border to spine, but below edge of ribs is tympanitic.

Urine is passed with much frequency and smarting when patient is out of bed, less so in bed. Fluid smoky, containing blood discs and pus cells. Menstrual history fairly good until four months ago, since then flow scanty, every two or three weeks. Vaginal examination reveals nothing abnormal. Pulse small, 108; respiratory system normal.

On July 1st, at the wish of Dr. Wilson Fox, I aspirated the tumour from behind, and drew off twenty ounces of dirty-yellow, fetid pus, stained towards the end with blood.

*Diagnosis.*—Pyonephrosis, with saccules not freely communicating with one another. Cause probably a calculus, though none was felt with needle on aspiration. The latter operation produced some weakness, nothing more. Next day the tumour had plainly refilled considerably.

Dr. Wilson Fox, having kindly asked me to take charge of the patient, her condition was explained to her, and operation proposed.

The very rapid development of the tumour to its present size led to some suspicion of a malignant growth in addition to pyonephrosis. The presence, too, of a mass undiminished in size, after aspiration had reduced the posterior swelling, gave some support to this view, which was suggested by Dr. Fox. This only strengthened the necessity for operation. But should this unaspirated mass in front simply consist of one or more abscesses distinct from that already emptied, the difficulty of draining the whole of the pus away from several separate chambers by aspiration led me to think that any operation short of removal of the whole organ would be as unsatisfactory as experience shows such operations usually to be. To break down, on the other hand, all the loculi into one ragged cavity in the kidney through an incision in the loin, I considered to be fraught with more immediate danger from hæmorrhage, and ultimate danger from pro-

longed suppuration, than the complete removal of the whole organ would involve. It was determined, therefore, to expose the kidney in the loin, and if found converted into a suppurating cyst to open it and search for a calculus. If the latter should not be found, or, if found, should be so firmly engaged in the organ that its removal would necessitate much laceration, that I should endeavour to remove the kidney and its contents *en masse*.

Operation on July 5th. Listerian antiseptics. An incision was made in the loin midway between the crest of the ilium and the last rib, commencing nine centimètres from the spine and running downwards and forwards for about four inches. The kidney was rapidly reached, only a few small vessels requiring care. I then endeavoured to enucleate the organ, but was hindered by its size. It was, therefore, aspirated, and about twelve ounces of fetid pus drawn off. Still the difficulty remained, and I was obliged to thrust my finger through a thin spot of the renal cortex and open a distinctly separate abscess, from which more pus escaped. After this the exact limits of the organ were found, and it was shelled out of its capsule without much trouble until the pedicle was reached. This was tied and the organ cut away. But during the endeavour to isolate the diseased mass in the first instance a very considerable amount of parenchymatous oozing had taken place. No individual vessel could be seen to bleed, but the tough, vascular, congested tissues yielded a free flow. This appears to me to be the most instructive point, and to teach the most important lesson of the whole case. The fact was this, as proved post mortem. The kidney was enveloped in a very thick covering, about three quarters to one inch in depth, consisting of the proper capsule of the organ with its surrounding fat and areolar tissue, the whole being converted into a tough, extremely vascular, and widely attached envelope. When I first reached the kidney I endeavoured to remove this envelope with the latter contained,



instead of seeking to enucleate the organ alone. It was in working with my fingers in this very vascular and tough perirenal tissue that much blood was lost. Eventually I removed the kidney from within the perirenal tissues with ease, and with a trifling loss of blood. The organ on removal was found to contain a small calculus, the size of a horse-bean, impacted in the commencement of the ureter, and to be consequently distended with pus, forming, however, several almost distinct abscesses.

The pedicle was tied in two portions with silk. After its division some small vessels sprouted, which were ligatured with little trouble. The mouth of the renal artery was also secured again for safety. Drain tubes and a gauze dressing completed the operation, which had lasted one hour and twenty minutes.

The patient was then carried back to bed in a very weak state, and in spite of all stimulation died three hours later of the shock of the operation.

*Necropsy* (July 6th).—Operation wound unchanged and without clots. In the situation of the kidney was found the very thick envelope mentioned above, consisting of the enormously thickened investing structures of the organ and forming even now a thick resistant mass in the lumbar region. On its peritoneal surface were seen numerous small whitish-grey bodies not unlike miliary tubercles. These were also scattered over the whole serous covering of the pelvis, and especially about the uterus. The small intestines were attached to the uterus by rather recent soft lymph. The small miliary bodies were also noticed abundantly in the mesenteric folds. Their nature was not more precisely made out. The peritoneum was not opened.

All the other organs were normal except for some adhesions at apices of both lungs and for some of the small bodies resembling tubercles already mentioned upon the surface of the liver. The right kidney was healthy.

The left renal artery and vein were included in the same ligature surrounding the whole pedicle just at their

division and contained thrombi in two cases. Their mouths were also secured.

The inner surface of the inflamed capsule showed the sacculated outline of the kidney very well.

CASE 3 (No. 46 in Table).—Mrs. S—, æt. 38, admitted into University College Hospital January 18th, 1880. Married many years; has never been pregnant: family history generally good, but father cut for stone in the bladder thirteen years ago. Has had a pain in right renal region for six or eight months, aggravated by exertion, especially since last Christmas. Swelling, noticed at same spot for last two and half months, has been increasing during last month. The pain is continuous not paroxysmal.

Menstrual history satisfactory. Urine sufficient, but offensive for some months, and contains much pus. Hæmaturia never noticed.

*Present state* (January 21st, 1880).—Thin and unhealthy looking, sallow and anæmic; lies on back or left side. Pulse 108, regular; circulatory and respiratory systems normal; bowels constipated.

On February 3rd complained of pain in tumour, which felt larger than before, also nausea and vomiting.

9th.—Slight rigor, less pain. Examination showed the abdomen flat, a tumour extending from border of right ribs to three quarters of an inch below level of umbilicus, which it nearly reached in midline. The surface of this tumour is hard and bilobed, smooth and tender. It moves downwards on deep inspiration, also inwards to midline. Its lower end is well covered by intestine.

The urine during this first stay in hospital was itself almost normal, quantity usually forty to fifty ounces in twenty-four hours, reaction acid, sp. gr. 1020, but contained usually a large amount of pus. The pus was more abundant after attacks of pain in tumour.

On February 21st, 1880, I passed an aspirator into the tumour from behind, 7 centimètres from spinous processes and midway between ribs and *crista ilii*. At about two inches deep was a calculus struck in the substance of the

kidney, which was at the same time pressed backwards by the hand on the abdomen. About one ounce of inodorous pus barely streaked with blood was aspirated. The calculus appeared large.

On February 23rd, 1880, the patient left the hospital, not wishing to have anything done for her renal disease.

She returned to University College Hospital, requesting operation, on September 2nd, 1880, when her condition is noted as follows:—Thin, flushed, eyes bright; profuse night sweats; pain in right hypochondrium and back, worse after movement, and occasionally shooting into right groin and labium; no rigor for some time; no blood, but abundance of pus in the urine.

The same tumour present as before, but it does not move with respiration; the percussion note is dull over its most prominent point, but elsewhere subtympantic, except over its lower end, where a full tympanic note is obtained. Fluctuation doubtful, and it is very tender.

For the next twenty days I watched the patient, and had the urine carefully observed, as well as the temperature, which rose at night and fell in a regular way, as is often seen in such cases, finally deciding to operate, though far less hopeful as to the result than six months previously when patient was first seen.

*Operation* (October 5th, 1880).—An incision was made downwards and forwards from the middle of the twelfth rib for five inches. The thickened perinephritic tissues were reached with ease, but some care was necessary to distinguish the various layers into which they could be torn from the actual surface of the kidney itself. On reaching the latter an aspirator needle was thrust through the cortex, and the stone found in the same position as noted six months before. Some clear fluid and some pus were then evacuated. I then cut through the cortex with Paquelin's cautery knife until the calculus was reached, which could then be felt with the finger embedded firmly in the pelvis of the organ and surrounded by offensive pus in small quantity. I seized it with a forceps and

withdrew a piece about as large as the last joint of the thumb, the larger part being left behind, very firmly embedded in the organ. Finding it very difficult to deal with this it was determined to enucleate the whole organ, which was done with little difficulty and but trifling oozing of blood. At the lower end the kidney was very firmly adherent to the capsular structures. In tearing this loose I was conscious of something extra-renal giving way, and believed it to be the colon, as was seen, post mortem, to be the case. But even after the organ was quite freed the pedicle could not be reached sufficiently to command the vessels. An attempt was then made to draw the kidney forward by means of a loop of twisted wire passed round the hilus, but also failed, the whole mass being very firmly attached to the spine by the tough fibrous tissue in which the structures of the pedicle were enveloped. I therefore tied a thick silk ligature round this mass as firmly as possible, in the hope that the organ might slough off, as has taken place in other cases. While tying this it could be felt to cut into the tissue of the organ. It was now found that the stone could be extracted. Silver stitches, a drain tube, and antiseptic dressing completed the operation, which had lasted one hour and ten minutes. Very little blood was lost during or after operation.

The pulse was good until the time at which the pedicle began to be manipulated freely. It then became very weak, especially when the ligature was tied. After the patient had been in bed for a time the pulse became better.

Next morning at 12.30 a.m. the patient was very weak in spite of various stimulants. She was quiet, however, and did not appear to suffer. She had vomited everything since the operation. She died at 3.30, or twelve hours after the operation.

*Autopsy* (twenty-six hours after death).—The operation wound was but little altered, and showed no blood effusion or clots. In the abdomen the viscera occupied their usual position, except the colon, which ran across at the level of

the umbilicus. The renal flexure of the colon was attached by old, tough, and blackish adhesions to the abdominal wall and lower end of the capsule of the kidney. It was here that in clearing the lower end of the organ during the operation I had torn a hole in the attached and almost sloughy colon large enough to take the finger-tip. A small rent in the adjacent peritoneum was also found. The rest of the abdominal cavity looked normal except for old and extensive peritonitic adhesions. A great mass of tough inflammatory tissue had formed round the kidney, especially towards the spine. Here the vena cava, renal vein, and artery were found embedded in it. This thick capsule reached from the spine to the crest of the ilium. It consisted of firm, whitish, fibrous material, about one inch thick, and was plainly the result of long-standing disease. This capsule was found perfect everywhere except where the colon was attached to it, and here the opening mentioned was seen from within. The kidney had separated very cleanly from it except at the same spot, and lay, still held by its hilus, in the cavity, somewhat bruised but smooth, and in this state of about normal size. It was impossible to distinguish the renal vessels in the tough fibrous mass mentioned without careful dissection.

On the whole, the conclusion seemed inevitable, from examination of the parts about the hilus, that in this case it would have been next to impossible to have isolated the pedicle sufficiently to have ligatured the renal vessels either *en masse* or separately. This was due, *not* to the depth of the wound, but to the very dense nature of the material produced by the chronic inflammation around the root of the organ.

The other kidney was normal in size and structure.

The other abdominal organs were also healthy, except the ovaries, which contained several cysts.

The conclusions which appear deducible from these two cases are as follows:

First, that the last of them was not suitable for

nephrectomy at the time operated on, although probably a fit case when first seen more than six months before. The great mass of tough perinephritic tissue surrounding it, especially at the pedicle, as well as the adhesion of, and impending sloughing in, the colon contraindicated the operation.

Next, that although it was undertaken late, it demonstrated the comparative ease with which the kidney can be enucleated out of its capsule even when the latter has been greatly thickened and become matted with the perinephritic tissues, but that though this is the case, it may still be impossible to deal satisfactorily with the vessels in the pedicle in some instances.

The first lumbar case, on the other hand, demonstrates the difficulty and danger of removing the kidney with its surrounding and much thickened capsule. This was found impossible in the first part of the operation, and resulted in much loss of blood, while a little later the organ was easily enucleated out of its capsule, and, unlike the other case, its vessels reached without too much difficulty and secured. Had I commenced in this instance by searching for the actual surface of the kidney and by "shelling it out" alone, much time and loss of blood would have been avoided, and I think the result would have been quite different. Too much stress cannot be laid upon this point in view of future operations. In every case where the surface of the organ has not been reached in the first instance and followed carefully, very great difficulty and delay in isolating it has resulted. In my own second case this was most notable, as also in that of Lefort.

On the other hand, where the surface of the organ has been carefully followed with the finger, enucleation has not been attended with very much difficulty. This was plain from my own third case, as well as from two others which I have seen operated on, namely, those of Mr. Couper and Mr. Baker.

The presence of a calculus in the kidney from an early

age which produced no injurious consequences until over twenty years later is also a point not to be lost sight of. Also the suddenness with which symptoms of pyonephrosis set in.

A few words regarding the incisions used in these cases. In each the lumbar wound has been oblique. As I had a large body to remove in both instances, I did not regard Simon's vertical cut as large enough, and consequently incised from the twelfth rib downwards and forwards. This incision gave free access to the organ in both cases, and I think was more desirable than the directly transverse cut such as one makes in colotomy. The latter brings the operator rather closely down upon the peritoneum, though this need not be necessarily wounded in consequence. It certainly has its advantages over the vertical incision, but I question if it is likely to be eventually as much used as the oblique, which can be prolonged to almost any extent downwards without trespassing too much on important structures.

A few words as to the resection of the last rib in order to obtain space for the hand in tying the pedicle. This has been twice done by Czerny successfully, the patient recovering in both cases (Nos. 25 and 42). It should be noted, however, that Dummreicher (No. 32), in carrying his incision upwards to what he supposed the twelfth rib, opened the pleura and caused fatal collapse of the lungs, the twelfth rib being only rudimentary in this instance, as is not uncommonly the case, and the eleventh being the last rib felt. In one of Czerny's cases the eleventh, in the other the twelfth, was resected, however, showing that the pleura is not necessarily opened in dealing with the eleventh. In my own last case I tried post mortem, before making a general examination, whether resection of the last rib would have facilitated tying of the pedicle, and, though I found the resection of the bone easy and not dangerous, satisfied myself that in this case it would have in no way diminished the difficulty.

Many other points of great interest come out in the

study of the cases already recorded, but being foreign to the scope of this paper must be reserved for another occasion. My object here has been to examine the subject in so far as it has any bearing upon the two cases now recorded in which nephrectomy was performed for calculous pyelitis.

As to the question of the effect of simple removal of one kidney on the system in otherwise healthy individuals, I have little to add to the remarks ventured on in last year's communication, namely, that it is not nearly so formidable an operation as is commonly imagined. Of this I think there is abundant extra evidence in the new list of cases I have now the honour to present in addition to those of the first list which appeared to me to prove this view. Any one who will carefully consider Nos. 35, 36, 38, 41, 42, will, I think, be convinced of the correctness of this assertion. The operation is no light one, of course, but I cannot but feel that the real difficulties of the whole procedure to be rather in the direction of early diagnosis and the avoidance of unsuitable cases than in its own intrinsic danger, and that in the future these difficulties will be overcome by patient study.



No. 1	Operator and original record.	Sex, age, state.	Diagnosis or aim of operation.	Evil dates back.	Date of operation.	Seat of incision.	Form of dressing.	Treatment of pedicle.	Symptoms after operation.
29	Hueter (Greifswald), 'Deutsch. Zeitsch. f. Chir.,' Bd. ix, p. 572	F., 4 years, healthy	Splenic or ovarian sarcoma	1 year	1876 4th July	Linea alba	Strictly anti-septic	—	—
30	Billroth (Vienna), 'Archiv f. Klin. Chir.,' Bd. xxi, S. 694	F., 46 years, healthy	Ovarian cyst	5 years	1876 18th July	Linea alba 9 cm. downwards from umbilicus	Listerian with drains, retroperitoneal wound well cleansed	Double hempen ligature	Acute peritonitis (2nd day, with fever, pain, vomiting, singultus, and meteorismus)
31	Heath (London), Private Note-book	F., 24 years, healthy, 4 pregnancies	Multifocal cyst of right ovary	1 year of pain and swelling	1877 28th Jan.	Linea alba: enlarged later	Cotton wool and strapping	Ureter tied alone, then vessels separately with silk, then <i>en masse</i>	Great pain, most vomiting. Symptoms of peritonitis set in on 3rd day, and fluctuated
32	v. Dummreicher (Vienna), 'Archiv f. Klin. Chir.,' Bd. xxv, H. 1, 1880	M., 33 years, weak, anæmic, suffering	Calculus pyelitis, with perinephritic abscess on left side	From childhood, worse last 10 years	1877 6th Aug.	Lumbar, Simon's incision, 12 cm. long	Plugging to check oozing, a large sponge over all	Ligature, but ineffectual	Shock, then improvement, finally collapse; urine bloody
33	Müller (Oldenburg), 'Berlin. Klin. Wochensch.,' No. 24, 1880	M., 21 years	Calculus pyelitis on left side	3 to 4 years	1878 18th Feb.	Lumbar, Simon's incision	Carbolised jute and carbolic injections	Double catgut and <i>en masse</i>	None special; slight attacks of fever whenever drainage was imperfect

<sup>1</sup> This table is in numerical continuation of that published

Result, mediate and eventual.	Hæmorrhage at or after operation.	Condition of organ removed.	Remarks.
during the opera- tion from hæmorrhage of the renal vessels	Furious at	Right atro- phied, with attached paranephritic sarcoma	Tumour weighed 2200 grm. (nearly 5 lbs.), was 22 cm. long by 14 broad, 11·6 thick ; it commenced at the hilus and spread into the kidney.
on 2nd day from peritonitis	Severe during, from the spermatic vein	Whole organ in a vast sac, showing only traces of renal tissue	Diagnosis not certain until removal was nearly completed. Although the dressing is stated to have been Listerian, spray only contained 1 per cent. of carbolic acid.
on 10th day from peritonitis	None during or after	Greatly distended pelvis, with remains of renal tissue at upper part	Patient rallied well from the operation, showed no signs of urinary troubles at any time. Went through the usual course of peritonitis, temp. only reaching 101°. Error of diagnosis recognised on opening abdomen. Calculus jambed in upper part of ureter.
on 2nd day from operation, owing to wound of left pleura and sudden collapse of lung; wound of pleura admitted little air	Severe during, from lumbar wound; oozing from renal tissue	Saccular and dilated; kidney imbedded in dense inflam- matory tissue; no calculi	The left 12th rib was only rudimentary, 3½ cm. long; hence the incision was carried up nearly to the border of the 11th rib on supposition that it was the 12th, and so the pleura was opened. During a second ligation of part of kidney tissue collapse came on with feeble pulse.
very complete in 16 days	None at, or after	Dilated into a large sac with small adherent calculi	The renal abscess was first opened Sept. 9th, 1877, and drained. The second opera- tion (nephrectomy) was called for to rid patient of dangers of constant septic fever from retained pus as the resulting lumbar fistulæ closed. Convalescence after second operation slow, owing to large abscess in the pelvis from perinephritic mischief, which had eventually to be drained into the rectum.

in vol. lxiii of the 'Transactions,' pp. 208 et seq.

No.	Operator and original record.	Sex, age, state.	Diagnosis or aim of operation.	Evil dates back.	Date of operation.	Seat of incision.	Form of dressing.	Treatment of pedicle.	Symptoms after operation.
34	Billroth (Vienna), 'Wiener Med. Wochens.,' No. 28, 1880	F., 35 years, four children by second marriage	Abdominal tumour, probably left ovarian	3 years	1879 1st Apr.	Linea alba, 11½ in. long	Anti-septic, with thymol spray	Ligatured	Rapid disappearance of shock. On day peritonitis began; increased 3rd and 4th; urinary symptom
35	Lossen (Heidelberg), 'Deutsche Zeitsch. f. Chir.,' Bd. xiii, H. 3, 4, 1880	F., 37 years, 3 months before 9th pregnancy	Tumour of right ovary diagnosed, no trace of urinary symptoms being present	1 year	1879 11th Aug.	Linea alba, from above umbilicus to near pubis	Anti-septic, carbolic spray	Ligature of ureter first, later pedicle with No. 2 silk, not by transfixion	Shock from loss of blood and ca. intoxication; died 12 hours after operation; fever on 6th day enteritis
36	Czerny (Heidelberg), 'Archiv f. Clin. Chir.,' Bd. xxv, H. 4, p. 858	F., 37 years	Hydronephrosis, rt. very movable, probably malignant	7 mos., rapid increase for 8 weeks	1879 6th Oct.	Linea alba	Anti-septic. Listerian	Ureter and 3 vessels ligatured, also the pedicle in two portions, with silk; cut short	None mentioned; apparently there none
37	Barker (London), 'Trans. Med. and Chir. Soc.,' vol. lxiii, 1880	F., 21 years, anæmic	Encephaloid of rt. kidney, tumour noticed 3 months	8 mos.	1879 23rd Dec. last-ed 1½ hour	Linea alba, 7 inches long	Strictly Listerian anti-septic	Transfixed & tied twice, vessels separately after, silk cut short	No shock, but vomiting continued last; senses throughout
38	Thornton (London), 'Brit. Med. Jour.,' 1880, vol. i, p. 71	F., 7 years	Hydronephrosis or hydatid of rt. kidney	5 yrs., tumour in abdomen	1880 2nd Jan. last-ed 1½ hour	Linea alba	Strictly Listerian anti-septics	Vessels tied separately, then <i>en masse</i>	None, except from carbolic intoxication
39	Lucas (London), 'Transact. of Int. Med. Cong.,' 1881	M., 34 years, wasted and worn out	Tubercular kidney with fistula in loin	Sinus in loin 6 yrs., following lumbar abscess	1880 17th Feb.	Lumbar transverse	Carbolic solution	Carbolised silk	Very little shock cause for an until secondary morrhage set in

Result, te and eventual.	Hæmorrhage at or after operation.	Condition of organ removed.	Remarks.
5th day from is, without evi- f urinary dis- ; urine abund- n the first, 1000 a last day	Free at first from tumour, and during, none after	Healthy kid- ney attached to a retroperi- toneal myo- fibroma, very vascular, and weighing 18 kilos.	Nephrectomy was not designed here, the kidney being removed with the mass because adherent. Death plainly resulted from peritonitis alone. The tumour lay between the layers of the broad ligament unconnected with any organ near. The early bleeding was from puncture of a large vein under the capsule.
perfect; re- come Sept. 25th. unt of urine had ormal in 9 days, it was half the antity	Very severe at, from pedicle, on slipping of ligature when kidney was cut away	Quite healthy, angio- sarcoma, 5-6 times the size of kidney, grew from surface of latter	A most remarkable case. The only bad symptoms were clearly due to endome- tritis and carbolic intoxication. The structure of the tumour was exactly the same as my own first. In this case, how- ever, the kidney proper was perfectly intact. This was also a very movable kidney, as was my own first case, No. 37.
complete; out on 30th day; no tion, and very ver at any time	None mentioned	Hydro- nephrotic organ with mere traces of renal tissue; the ureter was pervious	The only other notable points about this operation was that the enucleation of the tumour was very difficult; it was removed through a vertical slit in the ascending mesocolon, two vessels requiring liga- ture. During enucleation the sac burst, but very little of its contents escaped into the abdomen.
hours later, with and symptoms monary throm- oved to be pre- t mortem.	None during or after, the operation was practically bloodless	Two thirds of organ converted into a mass of encephaloid	The whole operation passed off from be- ginning to end without any difficulty, and was only an anxious one. A similar train of symptoms to those with which patient died had been noticed two days before death.
rapid and com- ut of bed on 9th itches removed Patient shown and Chir. Society all	None during or after	Enormously distended cyst of right kidney, full of urinous fluid	The most notable point about this case was the difficulty of diagnosis, and also the absence of symptoms not attributable to the carbolic intoxication.
slow. Pyuria ly less after ope- but persisted onths. Patient o Med.-Chir. Soc. all	Severe 14 days after, requiring plugging with sponge dipped in Fer. Perch.	Much pucker- ed on surface; removed with- out capsule; many abscess cavities	The kidney was removed in two parts, being very adherent to the ribs. Present state (October, 1881): scar sound, urine free from albumen and pus. Able to work as a bricklayer.

No.	Operator and original record.	Sex, age, state.	Diagnosis or aim of operation.	Evil dates back.	Date of operation	Seat of incision.	Form of dressing.	Treatment of pedicle.	Symptoms aft operation.
40	Czerny (Heidelberg), loc. cit.	M., 23 years, bad health and phthisis	Hydro-nephrosis left; tapped in 1880 in front of axillary line, 12½ pints drawn off	Probably congenital, painful 3 years, had burst 3 times	1880 9th Mar. lasted 3 hrs.	From old fistula in front of axillary line parallel to Poupart's later prolonged up to 12th rib	Listerian through-out with drain tubes	Ureter tied, also artery and vein easily, as also 12 other vessels	Shock
41	Czerny, loc. cit.	M., 23 years	Renal calculus on left side without a trace of tenderness or swelling on that side	From childhood attacks of pain with hæmaturia	1880 15th Mar.	Lumbar from tip of 12th rib, 12 cm. in direction of rib	Listerian antiseptics through-out with drain tubes	Ureter tied, then vein, later artery, pedicle long, easily reached, ligatures cut short	No fever or suppuration
42	Czerny, loc. cit.	F., 27 years, healthy	Uretero-vaginal fistula on right side	6 mos.	1880 3rd Apr.	Lumbar in direction of 12th rib, 2½ cm. of which were excised	Listerian antiseptics strict	Ligature of right artery, then of pedicle <i>en masse</i> with silk, cut short, 10 used	No fever or suppuration
43	Couper (London), 'Med. Press & Circular,' Nov. 24th, 1880	F., 17 years, strong and healthy	Pyonephrosis, with very fetid pus	1 year; acute 6 mos.	1880 24th Apr. lasted 2½ hrs.	Lumbar transverse like that for colotomy	Antiseptic	Ureter tied first with catgut, then the main vessels <i>en masse</i> , also an aberrant vessel	None of any no peritonitis though the peritoneum was cut and fouled with

Result, date and eventual.	Hæmorrhage at or after operation.	Condition of organ removed.	Remarks.
half an hour after ion was concluded shock, chill, and c intoxication ied	Hardly any after opera- tion; a few coagula only found in wound	Hydronephro- tic and full of masses of large round- celled sarcoma	Probably the most formidable case of the kind yet attempted. "The sac filled, not only the whole of the left abdomen, but reached into the lesser pelvis and be- tween the aorta and posterior layer of peritoneum into the right side far up under the liver and into the renal region." The sarcoma of the sac deter- mined the excision, which was not con- templated at first. P.M. revealed gland- ular infiltration; tubercular deposits in liver, spleen, kidney, and lungs; old pleuritis and pericarditis.
y. Healed com- in 14 days with- ever or suppara- Urine 564 c. cm. rch 16th, rose to c. cm. by 19th. oubles relieved sently by opera-	Severe from a vein when pedicle was cut; the main artery also found untied, none after these were secured	Healthy kid- ney, except for some dilatation of pelvis, in which lay a calculus 1.08 grammes in weight	Remarkably accurate diagnosis. Kidney easily reached; stone not felt in it at first; organ separated easily from peri- renal fat; pedicle quite accessible; vessels tied individually in two places. Kidney larger than usual, i.e. circa 10 oz. = 275 grms. Patient a very large man. Dia- gnosis based upon hæmaturia and great pain on exercise, which became at last impossible.
y. Healed com- on 15th day with- ver or pus; flesh gained and th recovered. on 1st day 66 2nd 610 c. cm., 324 c. cm. = 47	Free from an aberrant artery <i>during</i> , none after	Weight 4½ oz. = 118 grms. healthy	Patient a very small woman, lumbar wound consequently had to be enlarged by resection of 2½ cm. of 12th rib. Enucleation of organ very troublesome; an aberrant artery was torn at its upper end, but ceased, after some unpleasant bleeding, of itself.
y slow but most te. Out of bed on lay; left hospital g. 8th with only a f granulation in Patient shown in health at Hunte- rc. in Nov., 1880	None during or after; operation almost blood- less	Saccular and dilated; no calculi; 3 vessels entered the organ	This operation, which I had the advantage of seeing, was most instructive. The easy removal of the organ from within the thickened peri-nephritic tissues and capsule was remarkable, also the small size of the renal vessels. Also saw patient 7 months later, when she was in excellent health.

No.	Operator and original record.	Sex, age, state.	Diagnosis or aim of operation.	Evil dates back.	Date of operation.	Seat of incision.	Form of dressing.	Treatment of pedicle.	Symptoms of operation.
44	Czerny. Note to reprint of cases loc. cit.	F., 40 years	Cystic degeneration of lower end of right kidney; latter tolerably movable	1880, 3rd May	—	Linea alba	—	—	No bad reaction till second week
45	Barker (London), present paper	F., 32 years, feeble, anæmic, 12 years married, childless	Pyonephrosis, probably caused by impacted calculus	Renal pain since childhood, swelling noticed 1 month	1880 5th July aspirated on 3rd, last-ed 1½ hour	Lumbar oblique downwards, forward from middle of 12th rib	Listerian strictly	Silk ligature, pedicle tied in two parts, found insecure p. m., adequate while alive	Extreme shock
46	Barker (London), present paper	F., 38 years, married, childless, weak, anæmic	Calculus pyelitis was known to exist, stone having been touched with a needle	15 mos., pain and swelling 12 mos.	1880 5th Oct., last-ed 1½ hour	Lumbar oblique 5 inches from middle of 12th rib	Listerian strictly	Single silk ligature, including a part of the organ	Great shock
47	Lefort, 'Bull. d. l'Acad. d. Med.,' 1880, p. 1185	M., 23 years, un-healthy	Renal fistula in loin, the result of a wound	8 mos.	1880 20th May, last-ed nearly 1 hr.	Lumbar, vertical rib excised	Com-presses dipped in sp. camp.	Ligature tied with a double knot	Constant vomiting and pain
48	Spiegelberg (Breslau), 'Inaug. Dissertation,' v. H. v. Ostoja Lniski, 1880	F., 27 years, healthy, never pregnant	Hydronephrosis, right, no cause found before operation, afterwards an ureteral valve	10 years, tumour 3 years	1880 29th May, last-ed 1 hour	Linea alba	Listerian strictly, last-ed 1½ hours	1 large artery and 2 veins ligatured with silk together	Prolonged suppuration, fever, swelling of edge of abdominal incision around ligature

Result, late and eventual.	Hæmorrhage at or after operation.	Condition of organ removed.	Remarks.
on 49th day of without perito- l being well with lomen; abscesses in parotid gland, e sacrum, and in	—	—	—
om shock 4 hours peration	Free general oozing during manipulation outside cap- sule, hardly any when kidney was reached	Saccular, dila- ted to a large extent; a small calculus found in mouth of ureter	The difficulty of removal was much enhanced by the attempt to remove the kidney with its thickened capsule, &c. The great vascularity of the latter and its wide-reaching attachments in- volved much loss of blood in the stage. On regularly enucleating the organ later no blood was lost, and there was no special difficulty except in tying the pedicle.
from shock 12 after operation	None of any note at or any after	Somewhat sacculated with ulceration	The great difficulty here was to clear the root of the organ, which was hopelessly imbedded in a mass of fibrous tissue; as this could not be done sufficiently to justify cutting away the kidney the latter was left <i>in situ</i> to slough away. It was found p.m. that the colon adhered to the kidney and had had to be torn off in clearing the latter, and was at this point sloughy and perforated.
n 50 hours, due to nt vomiting	—	But slightly altered	It was found impossible to remove the organ with its thickened and inflamed capsule: it was therefore shelled out of the latter without difficulty, and the vessels tied.
y slow, owing to ent suppuration, lasted to Nov., cause apparently res. (Patient left al in Aug., 1880)	None at or after	Healthy on the whole, though en- larged with adherent fat about the hilus	Secretion of urine was never affected in this case. The ligatures came away on July 20th, Sept. 19th, Oct. 11th, 18th and 14th, Nov. 25th; after this date there was much improvement. When last seen, Nov., 1880, urine was abundant, sp. gr. 1008—1010, free from albumen or sugar.



No.	Operator and original record.	Sex, age, state.	Diagnosis or aim of operation.	Evil dates back.	Date of operation	Seat of incision.	Form of dressing.	Treatment of pedicle.	Symptoms of operation.
49	Meckel (Germany) 'Bayr. Med. Intellig. Bltt.,' 1879, No. 21	F., 28 years	Movable right kidney, with great pain	—	—	Linea alba	Anti-septic	Vessels and ureter tied carefully with carbol. silk cut short	Constant vomit fluid contains acid and ammoniacal combinations
50	Byford (America), 'Trans. Amer. Gynecol. Soc.,' 1880, p. 71	F., 39 years, married, 18 years, 6 children, unhealthy	Encephaloid of kidney, right	18 mos.	1878 14th Mar.	Linea alba, 7 inches	Strictly Listerian	Ligatured in 3 parts with silk cut short	None of note
51	Lange (America), 'N. York Med. Record,' vol. xviii, No. 6	F., 47 years	Pyonephrosis, right	3 years, attacks of pain, nausea	—	Lumbar	Strictly anti-septic	—	—
52	Cartwright (mentioned by), 'Lancet,' 1880, vol. i	M.	Prolapse of kidney owing to wound in loin	—	—	Lumbar	Dressed with pigeon's dung	Ligatured <i>en masse</i>	None
53	Stockwell (Bath), 'Med. Press and Circular,' Nov. 24, 1880, and private notes of operator	M., 54 years, healthy until 14 years ago	Calculus pyelitis	33 years, passed calculi 26 years ago	1880 2nd June	Lumbar, oblique, midway between ribs and c. ilii	Strictly Listerian with sponge in wound to stop oozing	Vessels tied separately with silk; also ureter	Shock and vomiting and restlessness
54	Baker (London), 'Trans. Inter. Med. Congress,' 1881	F., 7 years, delicate	Tubercular kidney	Nearly 2 years, attack of hæmaturia	1881 22nd Feb.	Lumbar	Lint and cotton wool	Ligature (silk) <i>en masse</i> , came away 9th day after operation	Exhaustion, but improving

Result, mediate and eventual.	Hæmorrhage at or after operation.	Condition of organ removed.	Remarks.
from uræmia only	—	Weight 145 grms., fatty	The liver and left kidney were in a state of fatty degeneration. Before operation urine free from albumen, feebly acid, sp. gr. 1005; after operation also free from albumen.
very rapid and complete	None	4½ lbs., encephaloid throughout	After some days fetid pus escaped from lower end of incision, and abdomen had to be washed out, but this did not prevent recovery. The tumour was very movable. Patient was last seen July, 1880, in perfect health.
64 hours after from loss of all renal tissue on both sides.	Quite incon- siderable during	Double bulk of a normal kidney, $\frac{2}{3}$ upper en- larged, lower $\frac{1}{3}$ cystic, with concretions	The opposite kidney was completely destroyed by old suppuration, its ureter being obliterated: it consisted of a cyst filled with cheesy matter; "no symptom indicated disease of the left kidney." There were many adhesions round the organ removed.
very rapid and com- plete; in 2—3 weeks was walking about	—	Normal	This case occurred in China, where a native received a slash in the loin, and came to an American ship's surgeon with the kidney protruding from the wound, having had it dressed beforehand with bird's dung. The surgeon removed it after ligature.
10 hours after the section of hæmorrhage renal vein	Severe 10 hours after from right vein causing death	Much en- larged, saccu- lated, weight 10 oz., and imbedded in in dense fibrous tissue	The dense mass of fibrous tissue enveloping the kidney made its removal extremely difficult, some of it coming away adherent to the organ, and bringing a small portion of the peritoneum with it. The chronicity of the affection accounts for the development of this dense material.
very	None of any note at, or any after	Tubercular, weight 2½ ozs.	Nephrotomy had been performed 2½ months previously without benefit. Kidney was removed from within capsule. Six months after nephrectomy still some pus in urine.



AN UNUSUAL CASE  
OF  
WARTY GROWTHS ON THE FACE.

BY  
GEORGE THIN, M.D.

---

(Received March 8th—Read April 26th, 1881.)

---

I SHOWED at a recent meeting of the Society the subject of a skin disease, which although perhaps frequently met with in its common varieties is, I imagine, very rarely developed in the manner and to the degree exemplified in this patient.

I believe the case worthy of being described to the Society because I am not aware that there is a portrait which shows similar appearances in any of the Skin Atlases. Amongst the several physicians and surgeons of much experience in diseases of the skin, to whom I showed the patient privately, there was no unanimity of opinion regarding its nature, and none of them could recall ever having seen a similar case.

I am further encouraged to bring it before the Society by the fact that its nature has been established by microscopical examination, and should a similar case come again under observation the diagnosis would not be so open to doubt as it was in this instance.

The patient, a healthy, young, unmarried woman, æt. 21, was introduced to me by her medical attendant, Dr. William Stewart, under whose care she still remains.

Any one looking suddenly at this person's face for the first time might get the impression that she was suffering from confluent smallpox. A closer examination shows that the whole face is covered with an eruption of small flat papules, slightly raised above the level of the skin and very thickly set everywhere, but more especially on the chin and lower parts of the cheeks. At some parts, near the mouth and on the chin, the papules have coalesced into small patches, but even in these the outlines of the original papules can be made out (see Plate V).

The term papule is used without prejudice. To be more minute, the papules consist of small rounded elevations, which feel hard to the touch and are of a brownish colour. They do not scale, are dry, many (but not all of them) depressed in the centre, produce no symptoms, and have no surrounding reactionary zone. The smallest are quite round, the largest ones more or less angular. When looked at through a magnifying glass some of them show minute red points. The very small ones are under the sixteenth of an inch in diameter, small ones about the twelfth of an inch, but the majority about the tenth of an inch. Having attained the latter size they did not grow larger, and they all remained only slightly elevated above the level of the skin. The face became covered by the continual growth of new ones until it attained its present appearance. The combined area of the growths now much surpasses the combined area of the unaffected skin. None of them have disappeared.

The distribution is peculiar. Until quite recently they were entirely limited to the face proper. The affected area was bounded by the hair of the scalp, the angles of the lower jaw, and the border of the jaw towards the chin. This was the case when I first saw her in the summer of 1880. About Christmas of the same year I found several on the skin of the neck beneath the chin, but the scalp

and other parts of the neck remained free. The lower eyelids and a small tract of skin below and external to them are free.

As regards the papules themselves, the most marked features are the colour, the elevation, size, shape, and great number.

They began to appear on the chin in 1877; after some time they went up the sides of the face, gradually encroached on the nose, then appeared on the forehead, and finally, on the upper part of the cheeks.

In 1879 they began to appear on the back of the right hand, where, on the 5th November, 1880, I counted thirty-nine. About the beginning of 1880 they were first noticed on the back of the left hand, where, on the date referred to, they were fewer in number than on the right.

Those on the hands were similar in size and general appearance to those on the face.

The rest of the body was entirely free from them, with the solitary exception of one that appeared on the bend of the right elbow in October, 1880.

My first impression of the case was that the disease was an epidermic growth—a kind of wart—and I attempted to scrape some of them off on the first occasion on which I saw the patient. The treatment was not tolerated, and new growths subsequently replaced those which had been removed. Their great number, their comparatively smooth or cup-shaped surface, and uniformity as to size were all characters which distinguished them from common warts, an opinion in which further I could obtain support from very few of my colleagues to whom I showed the patient. Microscopical examination of one of the small growths showed, however, that this opinion was correct, and that the papules were really small epidermic tumours, characterised by long narrow papillæ and deep broad inter-papillary projections. On the surface of these projections the horny epidermis was thicker and less homogeneous than in normal skin.

The connective tissue immediately beneath the growth was unchanged.

There was very slight cell exudation in the papillary layer immediately under the epidermis and a considerable amount in the elongated papillæ.

The changes in the epidermis being much in excess of those found in the connective tissue, I am disposed to look on the latter as being secondary to the former. The microscopical examination threw no light on the cause of the epidermic growth.

The distribution of these tumours on the face and on the backs of the hands has no relation to any distribution of nerves or blood-vessels, but their appearance first on the face, and then on the hands, does suggest a possibility of auto-inoculation.

Hebra, in his work on 'Skin Diseases' ('Hautkrankheiten,' Erster Band, Zweite Lieferung, second edition, p. 31), remarks that he has seen cases in which a large number of warts developed simultaneously on different parts of the body, mostly on the face, to such an extent that they might have been mistaken for the eruption of some other skin disease. They remain for several months and then disappear.

In the case which I have described their appearance was slow, gradual, but continued, and up to the present time (a period of three years' duration) not one has disappeared. A variety of local applications and a long course of arsenic have been tried without effect.

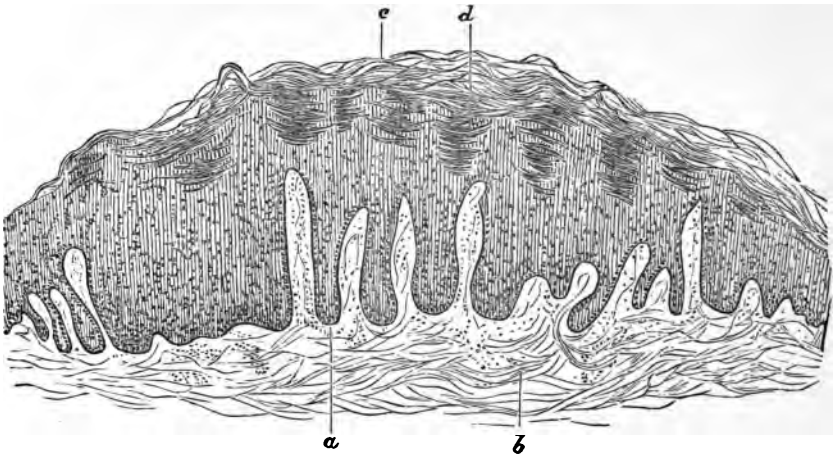


FIG. 1.—Microscopical appearance: vertical section through the whole of a growth which was excised from the back of the hand.  $\times 45$ .  
*a*, lower border of rete; *b*, connective tissue; *c*, horny layer of epidermis; *d*, horny layer penetrating downwards to an unusual depth.

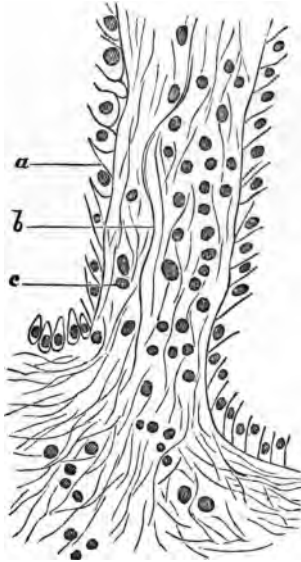
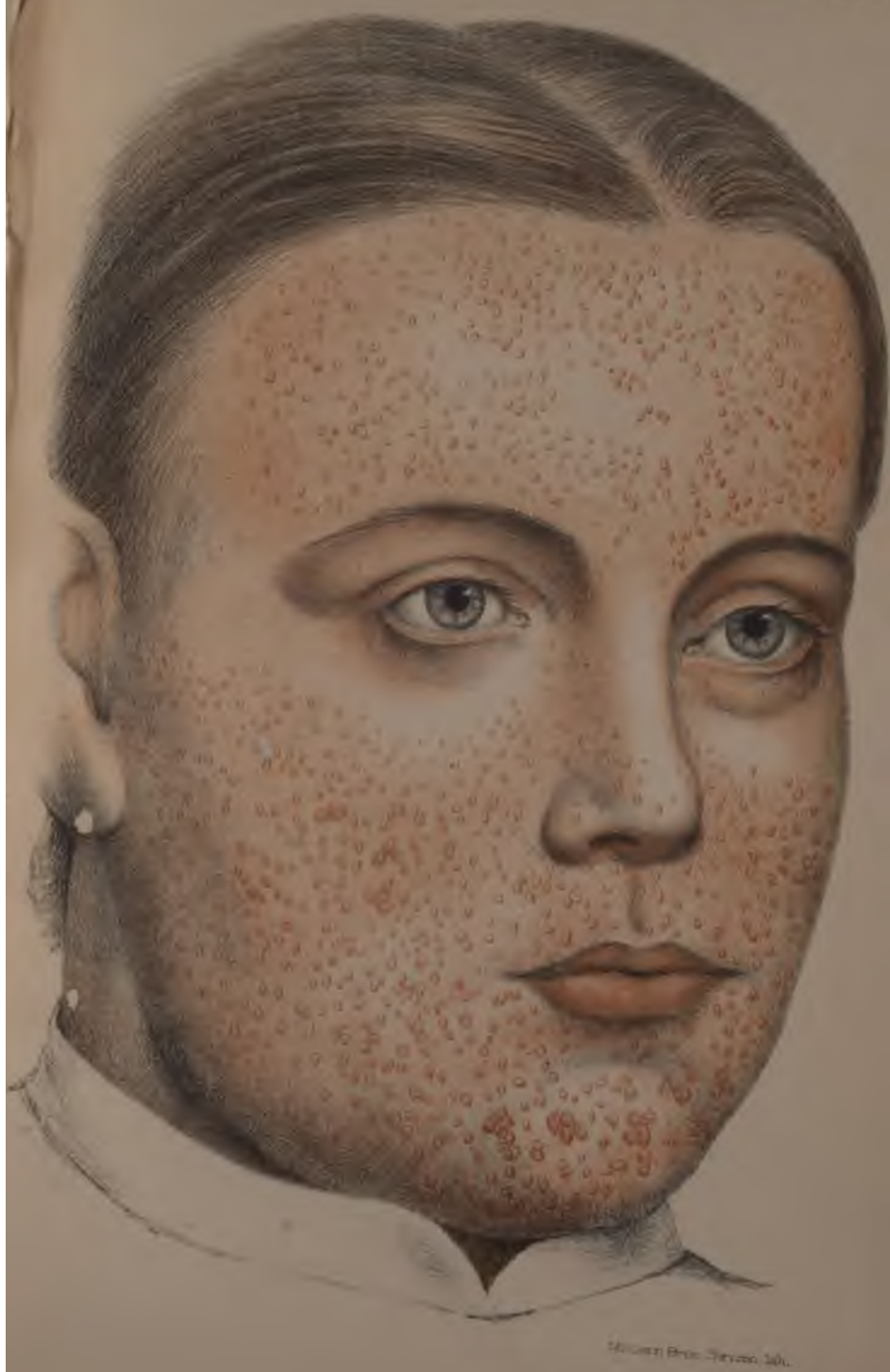


FIG. 2.—Microscopical appearance: lower part of a papilla, illustrating the cell-exudation present.  $\times 260$ .  
*a*, deep columnar cells of rete; *b*, capillary blood-vessel in papilla; *c*, exudation cells.



**DESCRIPTION OF PLATE V.**

**Case of Warty Growths in the Face; natural size.  
(George Thin, M.D.)**





A C A S E  
OF  
URTICARIA TUBEROSA,  
WITH UNUSUAL SYMPTOMS.

BY  
WM. MORRANT BAKER, F.R.C.S.,  
ASSISTANT SURGEON TO ST. BARTHOLOMEW'S HOSPITAL, AND SENIOR  
SURGEON TO THE EVELINA HOSPITAL FOR SICK CHILDREN.

---

(Received May 17th—Read June 14th, 1881.)

---

THE patient who forms the subject of the present communication is a man, Henry E—, æt. 33, who, for nearly two years, has suffered from a rare disease of the skin. For nearly a year he has been under my care at St. Bartholomew's Hospital, in the department for Diseases of the Skin, as an outpatient; and, on two occasions, during this period, I have admitted him into the hospital.

The general symptoms from which the patient suffers are those of persistent urticaria and so-called factitious urticaria; that is to say, very marked wheals can be produced at any time by scratching the skin; while there are frequently developed, without obvious cause, large tuberos swellings of the skin of various size, attended by much tingling and itching, which, after a variable number of

hours, for the most part disappear, leaving no trace behind.

The symptoms are most marked on the face, neck, ears, chest, knuckles, elbows, and knees; but the legs have been also affected, especially on their flexor aspect. In the last-named situations the wheals have usually made their appearance at intervals of about two days, but daily when the weather is cold. In cold weather, indeed, the affection is generally much worse, the eruptions more frequent, and the itching more severe.

In addition to these evanescent symptoms of chronic urticaria, however, the patient is troubled, and to a much greater degree, by well-defined hard tubercles, which, in certain parts of the body, notably the knuckles, elbows, and ears, persist for weeks or many months, although, at their first appearance, they cannot be distinguished, it is said, from those which depart within a few hours. As they appeared at the time at which the patient came first under my care, these persistent tubercles had but little resemblance to the papules or wheals of urticaria. They were firm to the touch, of a yellowish-red colour, and excessively tender; while in some parts, and more particularly the knuckles, the tubercles had become ulcerated, and exuded a sero-purulent fluid. (See Plate VI.)

The ears, which have been as much affected as any part, presented a very peculiar appearance. They seemed knotted, from the small hard tubercles which were scattered about in their substance—some singly, some in groups of two or three or more, while they were also much discoloured and of a purplish-red tint, as if from venous congestion. One could not help being struck by the likeness which they presented to the condition characteristic of Elephantiasis Græcorum. Occasionally, it is said, the ears, like the elbows and knuckles, have been the seat of ulceration.

The mucous membrane of the mouth, throat, and tongue has remained unaffected.

The general health of the patient is good. He has

suffered from gonorrhœa, but never from venereal sores. Five years ago he had rheumatism, but not severely enough to make him lie up, and he cannot remember any other illness.

In July of last year (1880) I admitted him into the hospital. At this time the symptoms were all well-marked.

During his stay in the hospital and a further period of five weeks at the Convalescent Hospital at Highgate he improved very much. All ulceration disappeared, and the tubercles in the ears, elbows, and knuckles became much less prominent. Indeed they nearly disappeared. The irritable condition of the skin was also less marked at the end of this period. Wheals could be produced by scratching the skin, but they were much smaller than before.

The treatment had consisted of the internal administration of arsenic in small doses, and the application to the sores of a soothing ointment of oxide of zinc.

The patient was again admitted into the hospital in February last, and, as before, rapidly improved; the uniform temperature and good diet having, I am inclined to believe, more to do with this than either the internal remedies or the ointments which were prescribed for him.

I confess to being in considerable doubt regarding the name which should be applied to the disease with which this patient is afflicted. The case does not appear to me to fall satisfactorily into any group with which I am familiar. So far as the symptoms of factitious urticaria are concerned, there is no difficulty. Such cases, although comparatively rare, are not infrequently seen. I have met with cases, also comparatively rare, of that aberrant form of urticaria (*urticaria tuberosa*) in which large patches of skin, sometimes two or three inches in diameter or more, become raised in various parts of the body, and persist for several hours, as in the present case, to the great discomfort and irritation of the patient; an affection

which, with intervals of relief, may last for many years, and which may or may not be accompanied by that peculiar sensitiveness of the skin, with respect to mechanical irritation, which is the leading feature of the factitious variety.

But I cannot recall a case, or find a record of one, in which symptoms of factitious urticaria and urticaria tuberosa have been combined with persistent nodular thickening of the skin in certain definite parts, which proceeds to ulceration.

It has been suggested, and the idea had previously struck me, that the case is allied to or identical with those cases which were first<sup>1</sup> described (in papers read before the Clinical Society) by Dr. Tilbury Fox and myself, and which seemed to deserve the epithet *urticaria persistens*<sup>2</sup> or *urticaria pigmentosa*. But the following differences prevent the present case from being at once grouped with those referred to :

1. All the cases hitherto recorded of *urticaria persistens* (vel *pigmentosa*) have begun in infancy.

2. In none of them, with a doubtful exception, has there occurred any ulceration. The doubtful case is Dr. Barlow's, but in this it is noted expressly that the child "has had scrofulous ulceration of the skin, but none of these pigmented areas have shown any tendency to ulcerate."<sup>3</sup>

If compelled to place the present case in any recognised group of diseases of the skin, I am disposed to class it with the cases of *urticaria tuberosa*; and to suppose, in the absence of further information, that the unfavourable circumstances in which the patient has been placed by losing his occupation (as a domestic servant) in consequence of his skin disease, has led to the inflammatory and ulcerative condition of some of the skin lesions.

<sup>1</sup> Unless the case recorded by Mr. Nettleship be one of the kind referred to (see 'Brit. Med. Journal,' September 18th, 1869).

<sup>2</sup> 'Trans. Clinical Soc. of London,' vol. viii, p. 51.

<sup>3</sup> 'Trans. Clinical Soc. of London,' vol. x, p. 196.

[For the details from which the notes of this case have been abstracted I am indebted to my friend Dr. Herbert Stowers.]



**DESCRIPTION OF PLATE VI.**

**Case of Urticaria tuberosa (Wm. Marrant Baker, F.R.C.S.).**



Fig. 1



Fig. 2



THE IMMEDIATE TREATMENT  
OF  
FRACTURES OF THE LEG  
BY  
PLASTER-OF-PARIS SPLINTS.

BY  
JOHN CROFT, F.R.C.S.,  
SURGEON TO ST. THOMAS'S HOSPITAL.

---

Received June 6th—Read June 14th, 1881.

---

I BEG to state that my main object in bringing this subject before this Society is to endeavour to popularise the practice of applying plaster-of-Paris splints immediately for fractures of the leg. Plaster of Paris has been employed to form an immovable apparatus or case for the treatment of fractures since its introduction in 1828 by Klüge. Mathieson, in 1854, first described the plaster-of-Paris bandage. A plaster-of-Paris splint or envelope made of flannel was used extensively by the Bavarian surgeons during the Franco-Prussian war. Mr. Bryant at Guy's Hospital has employed an apparatus made of flannel, stiffened with gum and chalk, for fractures of the leg after swelling has subsided. I mention these well-known facts as they contributed to my "make up" of these splints.

The history of the introduction and adoption of plaster

of Paris in surgical practice is too well known to require further recapitulation.

I wish it to be understood distinctly that I do not employ plaster-of-Paris *bandage*, and that I do not employ a single splint which completely embraces the limb, such as the Bavarian apparatus that was used in the Franco-Prussian war.

I use *side splints*, one for the inner side and another for the outer side of the limb. The bandage for applying these splints is made of soft, dry muslin, and does not contain any plaster of Paris, and just enough bandage is put on to keep the splints steadily in place. The splints themselves, shaped like the well-known short outside splints, are made of two layers of common house flannel. The layer which is to go next the skin is not soaked in plaster, but the outer layer is well saturated with it.

It will be perceived that in the event of swelling or other reason arising for taking off the splints they can be very quickly and easily removed. The muslin bandage which spans the interval between the splints in front can be cut down with scissors or penknife. First one then the other splint can be turned aside. It is not necessary to wholly remove them. Another bandage can be put on outside the first with suitable tension. In this way the fracture is not injuriously disturbed. That is a most important advantage of the apparatus, and bears closely on the question which comes uppermost in the consideration of this paper, viz. the *immediate* application of the splints.

The great objection to an immovable apparatus made of plaster-of-Paris bandage is that, should swelling of the limb come on, so much difficulty is experienced in removing the "case." Another objection is that uneven application of the bandage and plaster may lead to uneven pressure or constriction, and consequent swelling of foot and ankle. A third objection is the prospect of having to apply a second "case" when the first has been taken off. These objections have, I believe, operated chiefly in

deterring surgeons from immediately applying plaster of Paris for fractures of the leg. They have shrunk from the risks referred to.

Carefully pursued my plan is as safe as any other, and very advantageous.

During the six years that these splints have been in use I have had twenty-six house-surgeons and about forty dressers, implying twelve changes of house-surgeons and dressers. Notwithstanding this, no accidents of any significance have occurred from the use of these splints.

I believe that some surgeons still think that under no circumstances is it justifiable to cover in the injured part by splint or bandage. They think, on the other hand, that time must be given for the swelling to subside before the bandage may be carried over that part of the limb. Theory and experience have been against them for many years. My experience at St. Thomas's for a period of six years is decidedly in favour of quickly covering the part injured by an apparatus which ensures equal pressure and support.

The old opinions may be thus expressed:—1. That compression prevents the formation of provisional callus. 2. That compression delays union. 3. That the pressure or resistance of the splint &c. may lead to excoriation, slough, or gangrene of limb. 4. That the surgeon and patient are prevented from watching the progress of the case.

These opinions have been refuted over and over again, theoretically and practically, by experienced surgeons since the time of Larrey. We know that provisional callus is *not* necessary for the union of fractured bones, and we know that inflammation is not a necessary part of the repair of fractured bones.

I would advance in favour of immediate uniform pressure that (as regards the part about to swell) the physical phenomena are checked by it, the dilatation of the vessels is counteracted, and the exudation is prevented, provided the swelling is not due to rapid extravasation of

blood from a wounded artery. In another way uniform support prevents swelling. Spasmodic movements, which occur when the fractured bones are not properly supported and fixed, drive the rough ends of the bones into muscle and other tissues. This injury in its turn causes swelling. The perfect manner in which these side splints of plaster of Paris control the bones and abolish spasmodic movements prevents such secondary swelling.

May this apparatus be put on the limb when the latter is already red, swollen, and blistered? Yes; if pulsation in the tibial arteries is natural, the splints may be applied. If blisters have formed, they should be pricked, or drained by carbolised silk, and covered with carbolised oil. I have on several occasions applied the splints when the limb has been in the state referred to and the result has been eminently satisfactory.

I may particularly refer to two cases of Pott's fracture which were under my care in 1878. An attempt had been made by my house-surgeon in each case to treat it on a Liston's back splint. The displacement had recurred and swelling was on the increase. In one the integuments were blistered, red, and much swollen. Each patient was placed under the influence of chloroform, and I reduced the displacements thoroughly and applied the splints and muslin bandages. The comfort and relief and confidence which the patients derived from the proceeding made a great impression upon me. The splints were not taken off for six weeks, as no necessity arose for disturbing them.

In continuance of an examination of the advantages to be attributed to these splints I will take them in the following order:

*Perfect adaptation to the limb and maintenance of extension.*—The plastic material admits of the splints being accurately fitted to the inequalities of the limb. Whilst the plaster is hardening the fracture is kept by the surgeon in proper position. When the plaster has "set" the fracture cannot be unset by muscular action

the foot cannot approximate the knee, nor can the straight position become crooked ; once " set " it is always set.

*Diminution of risk of delayed union, and unrest.*—Since I adopted this plan my patients have enjoyed uninterrupted rest, and delayed union has become of extreme rarity. During six years one case of delayed union of fractured tibia and fibula has occurred in an anæmic Jew, who took no butcher's meat but only fish.

*Comfort to the patient.*—These splints are so comfortable that sedatives are only rarely required. This quality is one of the great boons which these splints have conferred upon patients and attendants. Little aches and pains which used to be tolerated are now not felt at all.

*Freedom of movement allowed the patient.*—The freedom which this plan allows the patient is obvious. He is at liberty to turn on either side, to bend his knee a little, to get up in a few days.

*Simplicity and cheapness.*—Its simplicity and cheapness are too evident to need comment.

*Economy of time and trouble.*—Saving of time and trouble ; these, too, are very evident.

### *The apparatus.*

This consists of, first, inside and outside splints made of common house flannel and plaster of Paris, and, secondly, of muslin bandages.

The splints are shaped somewhat like the old short outside splint ; the foot-piece is, however, wider. The inside splint is in every respect like the one for the outside. These splints should be long enough to extend from above the knee to the middle of the metatarsus, and together they should be in width about one inch less than the circumference of the limb at the corresponding part. A rough guide to the shape of the splint may be found in the injured person's stocking when it is laid flat on a table. Each splint is to be made of two layers of flannel.



The outer layer carries the gypsum, the inner forms a warm pliant lining, which protects the skin.

The splints are applied by means of muslin bandages. The bandage is put on like any other from the toes to the knee. One thickness is sufficient. Two bandages of five or six yards in length are more convenient than one of ten or twelve yards.

*To make the splints.*—A piece of house flannel which has been shrunk or which is warranted not to shrink or any suitable substitute is to be selected. The splints may be made by measurement. The measurements required are:—the circumference of the limb (1) below the knee, (2) at the biggest part of the calf, (3) just above the ankle-joint, (4) from the front of the ankle-joint round the heel to the front again, and (5) at the middle of the tarsus. Or the splints may be cut out from the pattern of the person's stocking. The flannel of the splint is to be in width half an inch less than half the circumference of the limb at any corresponding point. It should be long enough to extend from above the knee to the middle of the metatarsus. Four pieces of flannel are required, two for each splint. Two bandages of common muslin are prepared, each five or six yards long and two inches and a half in width. About a handful of good dry plaster-of-Paris is mixed with water to the consistence of thick cream. The inside pieces of flannel may be laid on the table or bed, the outer surface being upwards. The outside pieces are to be thoroughly soaked in the plaster separately and laid out on their respective inside pieces.

*Application.*—Whilst traction is kept up and the ends of the broken bones are maintained in apposition the splints are to be applied and smoothed out and the bandage is to be put on. Traction must be kept up whilst the plaster is hardening; the latter takes place in about three minutes. In applying the bandage, great caution should be observed that it is not drawn tightly anywhere, and that no one turn of the bandage is tighter than another. The support is to be equal everywhere.

*After-treatment.*—If it become necessary from any cause to inspect the limb at any spot or to ease the limb of a sense of tension, the muslin bandage can be cut down the front of the limb opposite the interval between the splints. In that situation and the corresponding one behind, the interval is spanned only by the muslin bandage. This having been slit up in front allows the surgeon to ease off one or both of the splints.

It is undesirable to wholly remove the splints. They are hinged together at the back by the muslin bandage. To readjust the splints it is only necessary to put on another bandage outside those already in place. It is better to leave the first bandage still adherent to the splints, as the material strengthens the flannel and plaster.

As swelling subsides and the splints become loose in any degree, an additional bandage should be put on to take up the "slack." The trimming of the apparatus may be done as soon as the plaster shall have hardened.

At the end of ten days or thereabouts the bandage may be gummed, or a fresh calico roller applied and gummed. Such an apparatus will last until splints are no longer needed.

At the end of a fortnight or three weeks, as the case may be, the patient may leave the hospital for his own home.

I do not employ these splints alone for fractures of the *femur*. The muscles of the thigh, arranged more or less loosely around a single cylindrical bone, change their shape and the shape of the thigh so much by their contraction and relaxation that the splints which fitted well at first do not lie closely later on. Cotton-wool lining does not prove a thoroughly efficient corrective. Therefore, for fractures of the femur, I prefer a long anterior splint of plaster of Paris, in combination with a long outside wooden splint. The anterior splint should extend from the crease of the groin to beyond the knee, about half way down the front of the leg. This has been found

to answer admirably. No perineal band is needed. Commonly the reduction of the deformity and the dressing are performed whilst the patient is under the influence of chloroform. Fractures at the junction of the upper with the middle third of the bone may be treated most successfully in this way.

*Fractures of the patella.*—The lateral splints have been found much superior in comfort and efficiency to any other wooden or metal splint. Pads, straps of adhesive plaster, and elastic traction have been ingeniously added to the splints, and excellent results have been obtained.

*Fractures of the bones of the upper extremity.*—I cannot specially recommend any form of plaster-of-Paris apparatus for these injuries.

*Use in delirious cases.*—This apparatus is extremely useful in delirious cases.

*Excision of knee- and ankle-joints.*—Splints made of plaster of Paris and flannel are of great service, either alone or in combination with metal splints.

*Fractures of the spine and pelvis.*—Splints made of plaster of Paris and flannel have proved of great service for these fractures.

*Postscript.*—This may prove the most interesting part of the paper, for it bears especially on the experience of this plaster-of-Paris apparatus, at St. Thomas's Hospital during the last six years, and the practice at other hospitals at the present time, with regard to fractures of the leg.

I am indebted to Mr. Battle, the present Registrar at St. Thomas's, for a few statistics which show the change that has gradually crept into use in our own hospital.

In 1875, at St. Thomas's, 97 simple fractures of one or both bones were treated.

63 by splints only.

19 by plaster of Paris only.

9 by splints first and plaster of Paris after.

4 by splints first and gummed band after.

2 by silica and whiting or gummed band.

In 1876, 105 cases were treated.

18 by splints only.

51 by plaster of Paris only.

34 by splints first and plaster of Paris later.

2 by silica and whiting or gummed band.

In 1877, 130 cases were treated.

13 by splints only.

84 by plaster of Paris only.

30 by splints first and plaster of Paris after.

3 by gummed bandage.

In 1878, 124 fractures were treated.

15 by splints only.

96 by plaster of Paris only.

13 by splints first and plaster of Paris after.

In 1879, 130 cases were treated.

2 by splints only.

125 by plaster of Paris only.

3 by splints first and plaster of Paris after.

In 1880, 131 cases were treated.

7 by splints only.

123 by plaster of Paris only.

1 by gummed bandage.

By this analysis we can trace the favour into which the immediate treatment by plaster of Paris gradually grew. In 1875, 19 out of 97 cases were treated by it, and in five years it had grown into such repute that in 1880, 123 cases out of a total of 131 were treated by it.

Treatment by splints alone declined in favour *pari passu*. In 1875, 63 cases were treated by splints only, but in 1879 and 1880 only 7 and 2 respectively.

From the foregoing analysis it appears that at least 498 cases of fractures of the leg have been treated immediately by plaster-of-Paris splints without any disasters.

In addition to the 498 cases immediately treated there are 89 in which the plaster apparatus was put on after a few days' use of splints. This makes a total of 587 cases treated without any ill results.

*Average stay in hospital.*—I cannot speak of the average

period of *cures*. I do not contend that this treatment has influenced the period of cure. The number of days or weeks during which the patient remains in the hospital depends partly on the surgeon, partly upon the demand on his beds, partly on the social condition of the patient, and on many other things. I can, however, say that the average stay in the hospital is shortened. With this apparatus on, protected by a gummed bandage, a patient is much more quickly in a travelling condition than under the old system of treatment by splints.

*Practice at other hospitals.*—I have added a table to show the practice at eleven of the metropolitan hospitals with reference to fractures of the leg, one or both bones. It is drawn from the replies made by the registrars of ten of the hospitals to Mr. Battle, the Registrar at St. Thomas's.<sup>1</sup> I beg to thank those registrars for their letters. (See table, p. 306.)

By this table it may be seen that the University College Hospital and St. Thomas's are the only two agreed in *systematically* treating fractures of the leg immediately by plaster-of-Paris apparatus. I believe I am right in stating that at University College Hospital the plaster-of-Paris *bandage* is used.

This is a most interesting table short as it is. How strongly conservative are some of the hospitals, and how tenaciously they cling to the old ways. I do not doubt they were *good* old ways, and I do not doubt that the *present* ways are good.

*In conclusion*, I would express a hope that the way of treating fractures of the leg which I have been advocating, and which, to some extent, is endorsed by the surgeons at University College Hospital, may grow in favour with the surgeons of other hospitals as it has grown in favour with the surgeons at my own hospital, and for the following reasons :

That it is the cheapest to the hospital.

<sup>1</sup> The letter from the Registrar of Westminster Hospital arrived too late for the meeting.

That it is the most comfortable to the patient.

That it makes the least demand on the time and attention of the surgeon and his assistants.

That it is quickly and perfectly efficient.

And that it is equally efficient for all simple fractures of the leg.

## 306 IMMEDIATE TREATMENT OF FRACTURES OF THE LEG.

Hospital.	Immediate treatment by plaster of Paris.	By splints only.	Splints first and plaster of Paris afterwards.	With bandage on leaving hospital.
St. Bartholomew's	—	Sidesplints, with Lawrence's back splint and swing, for four weeks	—	Gum and chalk, or plaster of Paris.
Guy's	—	Side splints and back splint, a single outside splint, for four weeks	—	Stocking, gum and chalk and flannel, or plaster of Paris.
University College	Fixed apparatus applied at once, plaster of Paris over wool, and flannel roller, starch bandage if soft parts much bruised	—	For complicated cases	—
Middlesex	—	Cline's side splints, Bell's iron back splint, for three weeks	—	Plaster-of-Paris bandage.
King's College	—	Cline's splint, or Mac Intyre's, or Dupuytren's, for five weeks	—	Stiff bandage.
London	—	Side splints and back splint, swing and cradle, short outside	—	Stiff bandage of silicate or tripolith or gum and chalk.
St. George's	Mr. Holmes employs starch bandage and pasteboard splints	Side splints with foot piece, Assalini's fracture box, Pott's splints, Dupuytren's or Salter's swing, for three weeks	—	Plaster of Paris, silicate bandage, pasteboard
Charing Cross	Plaster-of-Paris bandage for fracture of fibula	Side splints with foot piece, and swung in Salter's cradle, for four weeks	—	Plaster of Paris.
Royal Free	—	Side splints and back splint of wood, short outside	—	Plaster of Paris.
Westminster	Fractures of leg, in which little or no displacement, are put up in plaster-of-Paris bandages	Posterior splints, Mac Intyre's splint, inside and outside	Rarely	Plaster of Paris, and gum and chalk.
St. Thomas's	Immediate of plaster-of-Paris side splints	—	—	—

ON THE  
PATHOLOGY OF ACUTE PERIOSTITIS.

BY

CLINTON T. DENT, F.R.C.S.,  
ASSISTANT SURGEON TO ST. GEORGE'S HOSPITAL.

---

(Received May 24th—Read June 14th, 1881.)

---

THE geographical distribution of disease is a subject which has received its due share of consideration, but a branch of this wider question, viz.:—the variations in different countries and among different nationalities of diseases everywhere common, has not perhaps met with the attention which it deserves. I am inclined to think that the disease treated of in the present paper may possibly furnish evidence that given pathological changes may vary in their progress and results according to the nationality of the patient in whom they are manifest; this is the case with other diseases. Among the Germans and the Turks, for instance, there is a remarkable susceptibility to carbolic acid poisoning.<sup>1</sup>

Sufficient proof that the pathology of acute periostitis has been matter for difference of opinion is afforded by its varied nomenclature. Thus, it has received the name of "acute periostitis," "osteomyelitis" (Billroth),<sup>2</sup> "péri-

<sup>1</sup> Billroth's 'Chir. Klin.,' 1876, p. 39.

<sup>2</sup> 'Surg. Path. and Therapeutics,' London, 1877, p. 289.



ostite phlegmoneuse" (Giraldés), "ostéite phlegmoneuse diffuse,"<sup>1</sup> "abcès sous-périostique aigu,"<sup>2</sup> "ostéite épiphysaire," &c. The exact relation which acute periostitis and osteomyelitis bear to each other, as well as to the articular affections with which they are so often associated, have long been matters of dispute; so also have their effects with regard to the extent of necrosis which usually follows. Among French surgeons the opinion originating with Chassaignac is very generally held, that total necrosis of the shaft will not take place as a sequel of acute periostitis alone, but that osteomyelitis must have coexisted. German writers<sup>3</sup> seem also to have adopted the same conclusion very generally. On this question there seems to be some difference of opinion between continental surgeons and those in this country; but the difference is less than it might appear at first sight, and can be well estimated from a critical *résumé* in the 'London Medical Record,'<sup>4</sup> by Mr. Holmes, on the subperiosteal removal of the entire diaphysis of the bone for diffuse phlegmonous periostitis. Two points may be gathered from this paper:—(1) That osteomyelitis need not necessarily be associated with acute periostitis, and (2) that the entire diaphysis of a bone may be so completely necrosed, as a result of periostitis unaccompanied by osteomyelitis, as to render its subperiosteal removal justifiable and necessary.<sup>5</sup> Thus in the case recorded by

<sup>1</sup> Cornil et Ranvier, 'Manuel d'Histologie Pathologique,' Paris, 1881, p. 399.

<sup>2</sup> Chassaignac, 'Mém. de la Société de Chirurgie,' tome iv, p. 281.

<sup>3</sup> See a case of acute periostitis of the tibia reported in Billroth's 'Chir. Klin.,' 1867, p. 487, Berlin, 1869.

<sup>4</sup> For 1876, p. 73.

<sup>5</sup> Cases where this has been done are referred to in the 'London Med. Record' for February 15th, 1876, p. 73, by Mr. Holmes. See also the 'Lancet,' vol. i, 1866, p. 340 (referred to by Verneuil in the 'Gaz. Hebdomadaire de Med. et Chirurgie,' 1866, No. 21, p. 321); 'Med.-Chir. Proceedings,' vol. viii, p. 434 (Mr. W. Pye's case); Weinlechner, 'Allg. Wien. Med. Zeit.,' No. 24, 1879 (referred to in the 'London Med. Record,' August 15th, 1879); Holmes, 'St. George's Hosp. Reports,' vol. x, p. 500, and 'Surgical Treatment of the Diseases of Childhood,' 2nd ed., p. 385, and elsewhere.

Mr. Holmes, in which he performed this operation, there was no trace of osteomyelitis in the part of the bone (the tibia) examined. I shall presently have to advert to similar cases.

Considerable difference of opinion prevails with regard to the exact tissue where the changes commence in acute periostitis. The majority of English writers<sup>1</sup> seem to hold that the affection either commences in the deeper osteogenetic layer of the periosteum, or as a superficial ostitis, and that effusion or pus raises up the tendinous periosteum, thus leading to the denudation and necrosis of the bone. I do not think that the view is with us generally entertained, that acute spontaneous osteomyelitis is an affection of common occurrence, but it would seem to be otherwise on the Continent, judging by the writings of continental surgeons, particularly of German surgeons, and from the descriptions of their cases. The term *abcès sous-périostique aigu* employed by Chassaignac, signifies partial agreement with the opinion that acute periostitis begins beneath the periosteum. Cornil and Ranvier state that the disease consists principally in diffuse suppuration, which may have its seat in any part of the bone—beneath the periosteum, in the superficial layers, in the osseous tissue, or in the central medulla, which is tantamount to saying that there are no means of distinguishing clinically between acute periostitis and osteomyelitis. Billroth and other German surgeons go further, and express very decided views on this affection. Billroth, for instance, in an exceedingly able and suggestive essay on these diseases,<sup>2</sup> states that acute periostitis commences as inflammation of the outer cellular layer of the periosteum; according to his views the fibrous periosteum is destroyed subsequently by suppuration, and thus the bone becomes exposed. Extension inwards of the inflam-

<sup>1</sup> Cf. for instance, Holmes's 'Principles and Pract. of Surg.,' 1st ed., p. 392, and 'A Syst. of Surg.,' 2nd ed., vol. iii, p. 741; also Crampton "On Periostitis," 'Dublin Hosp. Reports,' vol. i, p. 331.

<sup>2</sup> 'Surg. Path.,' Hackley's Transl., pp. 289—293.

mation may lead to osteomyelitis. Further, according to Billroth, if it be denied that the outer layer of the periosteum constitutes part of that membrane, but is to be looked upon as the intermuscular cellular tissue, then there is no such thing as acute periostitis, for the tendinous part of the periosteum, he remarks, is as little liable to primary inflammation as the fasciæ or tendons. I hope to be able to show directly that this does not hold good universally, but that the views of Cornil and Ranvier, which have just been adverted to, are nearer the mark.

With regard, first, to the curious affection which attacks the terminal phalanges of the fingers (panaritium periostale of the German writers) and to which the term "whitlow" is somewhat loosely applied by writers in this country, it may be remarked that this is considered by some to be due to acute spontaneous osteomyelitis.<sup>1</sup> Now I do not think that this opinion is generally shared in this country; and it appears rather to me that the older view is more correct.<sup>2</sup> From some slight injury—often from no apparent cause—inflammation of the cellular tissue, tending to become diffuse, commences in the pulp of the finger. Owing to the close connection which exists between all the tissues of the part, from the skin down to the periosteum and bone,<sup>3</sup> and the unyielding nature of these tissues, necrosis of the whole phalanx readily results. It would seem *prima facie* most improbable that the affection should begin as osteomyelitis, but it is not unnatural that this complication should follow, although Chassaignac partly denies that subperiosteal abscess will give rise to osteomyelitis;<sup>4</sup> but he is here speaking of the disease as

<sup>1</sup> Billroth writes, "Akute spontane Osteomyelitis ist mit Ausnahme der Endphalangen (panaritium periostale) an den oberen Extremitäten selten," 'Chirurg. Klin.,' 1871-76, Berlin, 1879, p. 426.

<sup>2</sup> See Crampton, *op. cit.*, p. 333.

<sup>3</sup> Humphry 'On the Skeleton,' pp. 18 and 394.

<sup>4</sup> Chassaignac, who at one time appeared to doubt whether osteomyelitis was ever produced by subperiosteal abscess, seems to allow that this may take place by a case which he records in the 'Mém. de la Société de Chirurgie,' Tome iv, 1857, p. 320. An essay on the subject by the same author, entitled

it attacks the long bones, where the conditions are widely dissimilar. In panaritium periostale, then, if we suppose what I think undoubtedly to be the case, that the outer layers of the periosteum, *i.e.* the pulp of the finger, are primarily affected, we may seem to support the view that the same may obtain elsewhere; but the anatomy of the periosteum in other parts, say over the inner surface of the tibia or the lower third of the femur, is totally different.

Microscopical observation shows, that in some cases at least the inflammation distinctly commences beneath the periosteum, and again, that the characteristic effects of this disease may result without the occurrence of any osteomyelitis. This was the case in the following instance:

A boy, *æt.* 13, was admitted into St. George's Hospital under the care of Mr. Holmes,<sup>1</sup> with acute periostitis of the tibia. Free incisions were made over the inner surface of the tibia and the bone was found exposed. Ultimately, on the 19th day of the disease, it was found necessary to amputate the thigh in order to save the patient's life. The knee-joint in this case was affected. A small piece of the thickened, softened layer next to the tibia was removed for microscopical examination. Especial care was taken to select the periosteum from a part where there were no overlying muscles. Sections were cut vertically through the specimen, which showed the appearances illustrated in Plate VII. On the side next to the bone was seen a uniformly thick layer of small cells. Above this the distinct layer of the fibrous periosteum, in one part of which commencing formation of new bone could be plainly made out. Still more external, in the parts overlying the fibrous layer, were evidences of extensive inflammation. The whole specimen was enormously vascular. It may be noted here, then, that the inflammation was

"Mémoire sur l'Osteomyélite," will be found in the 'Gazette Médicale' for August and September, 1854.

<sup>1</sup> To whom I am indebted for kindly permitting me to refer to this and other cases.

further advanced beneath the periosteum, where completely formed pus was found, than in the outer cellular layer, where the parts were merely infiltrated. Careful examination failed to show any inflammation of the medulla or of the substance of the bone itself. In the compact tissue there was not the slightest trace of what Mr. Erichsen has well termed "laminated expansion" of the bone, nor was there even the faintest discolouration. Examination of the medulla, indeed, showed changes more characteristic of breaking down, disintegration, and necrosis of that tissue than of actual acute inflammation or the sequelæ thereof. As seen under the microscope the fat cells were indistinct, granular, and breaking down. The whole specimen, in short, resembled medulla taken from a bone after decomposition had set in; but in this case, as the preparation was made from an amputated limb, properly preserved from the first, the disintegration must have taken place before the operation. I do not think, either from the appearance of the bone or the medulla, that the changes were the result of previous osteomyelitis, for the appearance was very different to that in a case to be presently described. I rather hold that the changes seen may be explained by the cutting off of the vascular supply owing to the periosteal affection, for this was a case which distinctly showed what Chassaignac has termed "décollement périostique."

I am aware that this view as to the breaking down and disintegration of the medulla is altogether at variance with that held by the French surgeons. Gerdy<sup>1</sup> goes so far as to doubt whether destruction of the medulla, other than that due to suppuration, ulceration, or new growths, has ever been seen. He states also, that he does not know of any examples of gangrene of that tissue. Nevertheless, if the medulla be examined it will be found to present very diverse appearances in different cases. No doubt periostitis, ostitis, and inflammation of the medulla are usually so mixed up together by the time the cases

<sup>1</sup> "Périostite et Médullite," 'Arch. Gén. de Médecine,' 1853, p. 141.

come under observation in hospitals, that the changes brought about in the medulla, either from the pre-existing inflammation or from necrosis of the tissue, might be indistinguishable one from the other; but when the bones are examined at an early period, as for instance, in the case above mentioned, the changes in the medulla due to the condition of acute periostitis alone present a marked contrast to those resulting from active inflammation of the tissue.

The other specimen (Plate VIII) was taken from a man *æt.* 21, in whom the disease first showed itself as an acute inflammation of the knee-joint. Subsequently acute periostitis of the lower third of the femur became evident, and eventually the thigh was amputated. I had not an opportunity of examining the medulla in this case, but there was no appearance of inflammation at the level where the femur was sawn through. In this case also, as shown in the drawing (Plate VIII), the inflammatory changes were chiefly seen in the deeper layers. The periosteum was lifted away from the bone, thickened, infiltrated and vascular. Inflammation was more advanced in the inner than in the outer layers; the infiltration extending outwards was chiefly noticed around and about the smaller blood-vessels.

The form of acute periostitis which Billroth describes as attacking the outer layers of the periosteum is, I think, more frequently seen over the lower third of the femur than anywhere else. The following case is an example of this variety:

A boy, *æt.* 9, was admitted into the Belgrave Hospital for Children under the care of my colleague, Mr. W. H. Bennett, with slight swelling over the hip-joint and pain in moving the limb. I am unable to refer to the notes of the case, but can recollect that the affection was of very recent date, not more than a few days. Under the influence of rest in bed, the symptoms about the hip-joint subsided, but acute synovitis of the knee then set in. Very shortly afterwards a fluctuating swelling was observed in

the popliteal space. An incision was made and the finger passed in went down at once to the popliteal space, but the bone everywhere was covered. Gradually the knee-joint recovered, and the abscess healed up. Such cases are not uncommon, although it too often happens that timely treatment is not adopted, and the periosteum thus becomes destroyed and the bone exposed. I merely cite the case here as furnishing a good and uncomplicated example of the variety of the disease described by Billroth. With regard to the articular affection, it may be observed, as has been pointed out, that, genetically speaking, the capsule of the joint is a continuation of the periosteum.<sup>1</sup>

The following case is a typical one of intensely acute periostitis :

A girl, æt. 15, was admitted into St. George's Hospital with acute periostitis of the right tibia. Four days before her admission she felt ill, and had a rigor. Two days before her admission a slight blow over the tibia from a fall called her attention to the condition of the bone. The morning after admission the temperature was 104°, the pulse 145. The whole of the right leg below the knee was swollen and painful. At the upper part was an elastic, tense collection of fluid over the tibia. Incisions let out some blood-stained fluid, but no pus. The bone was extensively denuded. She died of pyæmia nine days after her admission—probably on the thirteenth day of the disease.

*Post mortem.*—The entire shaft of the tibia was evidently necrosed. The periostitis, as stated, began over the upper third of the tibia. There was no trace of osteomyelitis at this point, but lower down, at the centre of the shaft, the compact tissue over a very small extent of the bone was slightly laminated and discoloured, and the medulla beneath disintegrated and breaking down at one point into pus. Still, in this case I can hardly believe that the osteomyelitis was other than secondary to the

<sup>1</sup> Billroth's 'Surg. Path. and Therapeutics,' p. 290. See also Du Hamel "On the Relation of the Epiphyses and the Articular Cartilage to the Periosteum," 'Mém. de l'Académie Royale,' 1743, p. 143.

periostitis,<sup>1</sup> nor could this little localised patch of osteomyelitis have determined the total necrosis of the shaft. As a rule, however, where the symptoms take such an acute course and lead, as in this case, to metastatic abscesses in the lungs and disorganization of the joints, it is usual to find more extensive osteomyelitis.

To sum up. Acute inflammation may occur in the tissues immediately external to the periosteum, as in the case of the boy recorded above (p. 313). Such inflammation may lead to destruction of the periosteum and exposure of the bone, unless relieved by timely treatment. The affection is often exceedingly difficult to distinguish from acute subperiosteal abscess,<sup>2</sup> *i.e.* true acute periostitis. It is frequently associated with inflammation of the neighbouring joints, and attention is often drawn to the condition by the affection of these parts.

Acute periostitis, as we know the disease, usually begins in the deeper osteogenetic layer of the periosteum<sup>3</sup> by inflammation and exudation around the vessels; the periosteum will become more or less detached and lifted up from the bone by the exudation,<sup>4</sup> and in parts it will be actually destroyed. This condition may lead simply to exfoliation, or may be the precursor of more extensive necrosis, but it is not necessarily associated with osteomyelitis, even although all the train of symptoms, as we so frequently see them, be present. Acute periostitis, according to Chassaignac, comparatively seldom affects the joints,<sup>5</sup> and this is true, but the exceptions to this rule are numerous enough. Acute periostitis may lead to destruction

<sup>1</sup> See note 4, p. 310, *supra*.

<sup>2</sup> On the Diagnosis of the several conditions from each other, see Chassaignac, *op. cit.*, p. 326.

<sup>3</sup> I do not see how we can distinguish clinically from this—the commoner form—the disease which commences primarily as an acute ostitis.

<sup>4</sup> True pus does not commonly form so very rapidly.

<sup>5</sup> *i.e.*, the joints at either extremity of a long bone attacked by the disease. Pyæmic affections of the joints are only too common, especially when osteomyelitis exists, and must be carefully distinguished from the varieties here referred to in the text.



of the medulla, without the occurrence of any acute inflammation of that tissue. Acute primary osteomyelitis is a rare disease in this country.

With regard to the age of the patients, it is well known that those about the age of puberty are chiefly liable to the affection, but many cases are recorded at the extremes of life. An instance has been published of diffuse periostitis at the age of eleven days.<sup>1</sup> As an illustration that the old are not exempt, I may mention the case recorded by Billroth,<sup>2</sup> of a man, æt. 70, who was attacked with acute periostitis and osteomyelitis of the humerus from no known cause, and died of pyæmia.

I need hardly point out that although it is perfectly true that these various forms of the affection become confounded together very early, yet it is not on that account any the less important to study their separate courses, in so far as this is possible. The various forms will lead severally to widely different results, especially when—as unfortunately happens far too rarely—they are modified by early treatment. With this latter branch of the subject I am not now concerned.

<sup>1</sup> 'Path. Soc. Trans.,' vol. vi, p. 284.

<sup>2</sup> Billroth, 'Chir. Klin.,' 1867, p. 417, Berlin, 1869.



## DESCRIPTION OF PLATES VII AND VIII.

Pathology of Acute Periostitis (Clinton T. Dent, F.R.C.S.).

### PLATE VII.

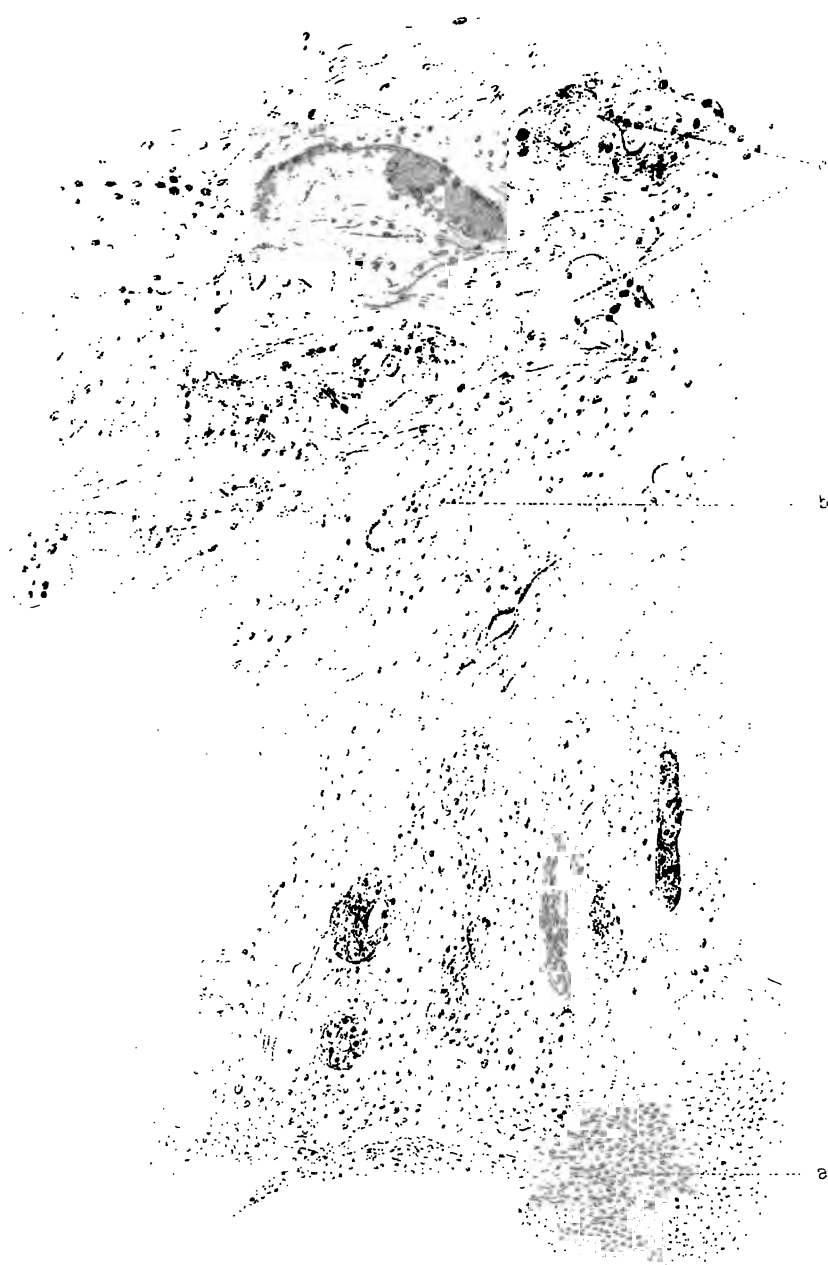
Vertical section of periosteum from a case of acute periostitis.  
× 100.

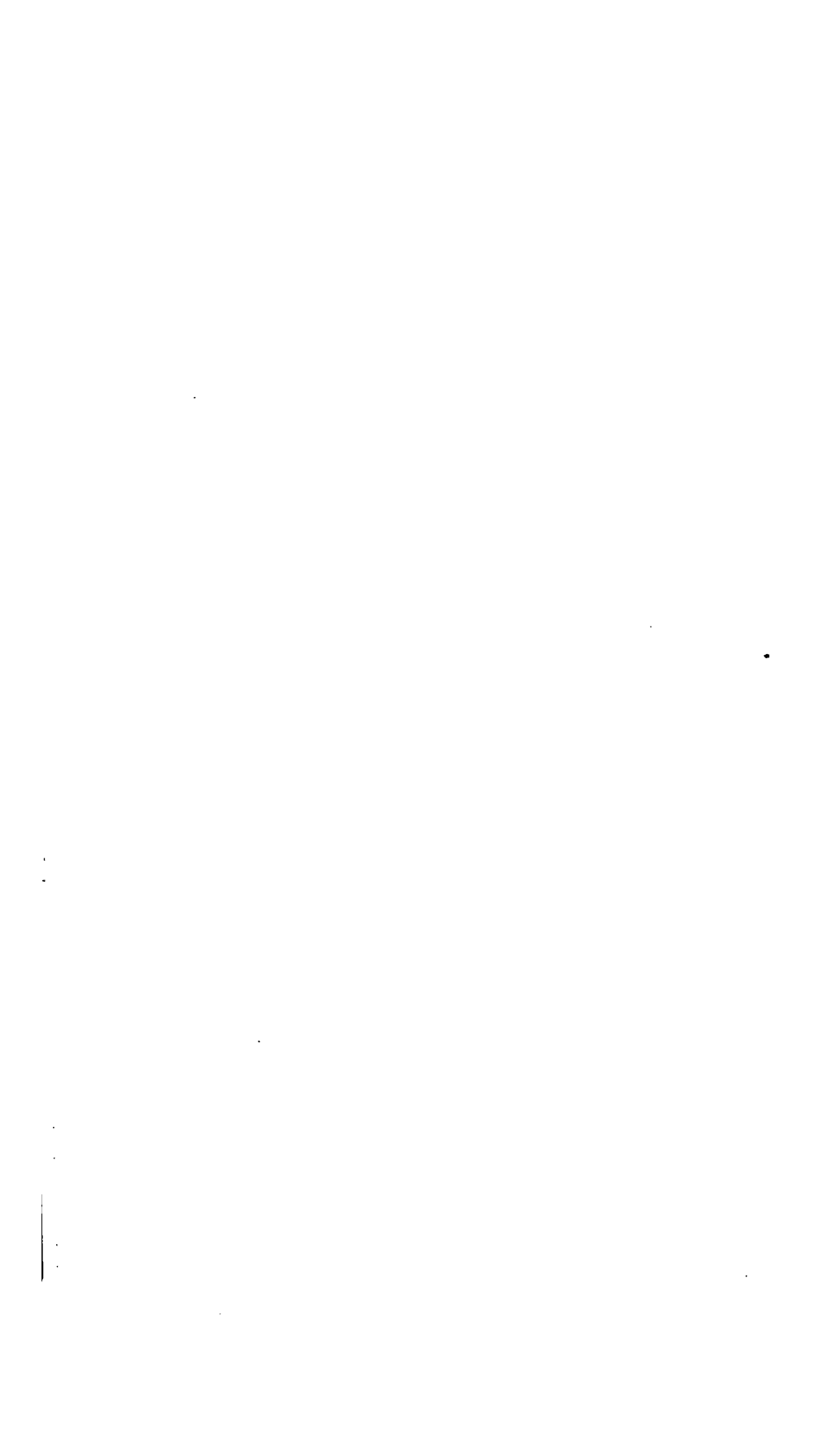
- a.* Layer, next to the bone, of small granulation cells and pus.
- b.* Fibrous periosteum.
- c.* New bone developing in the periosteum.

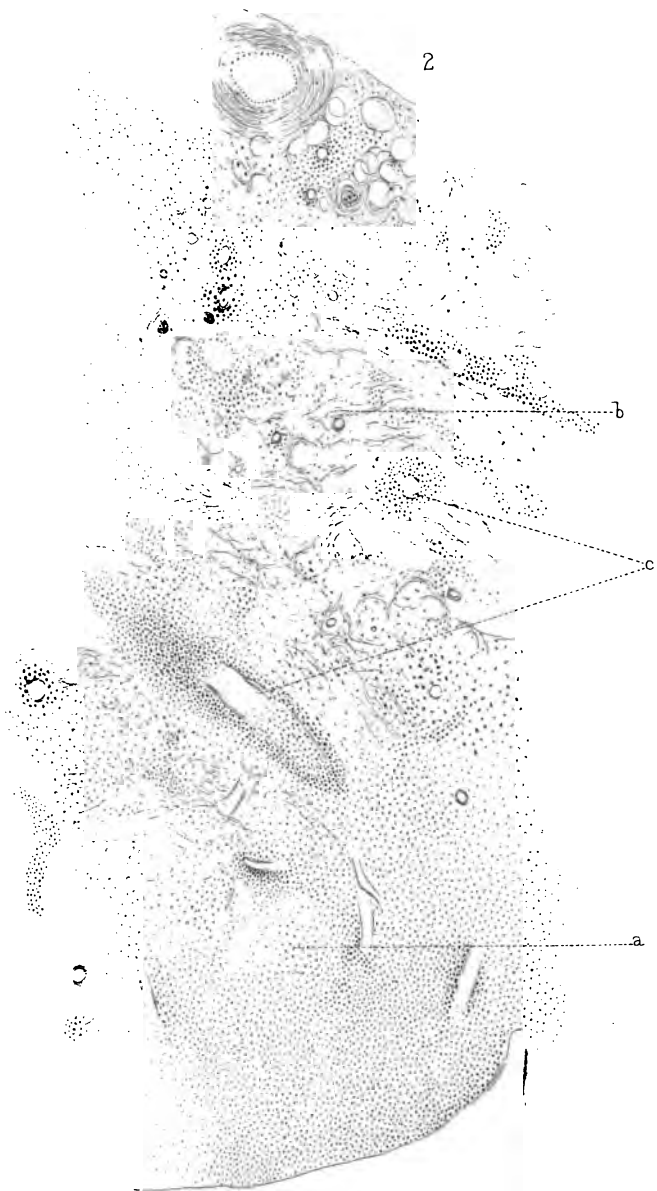
### PLATE VIII.

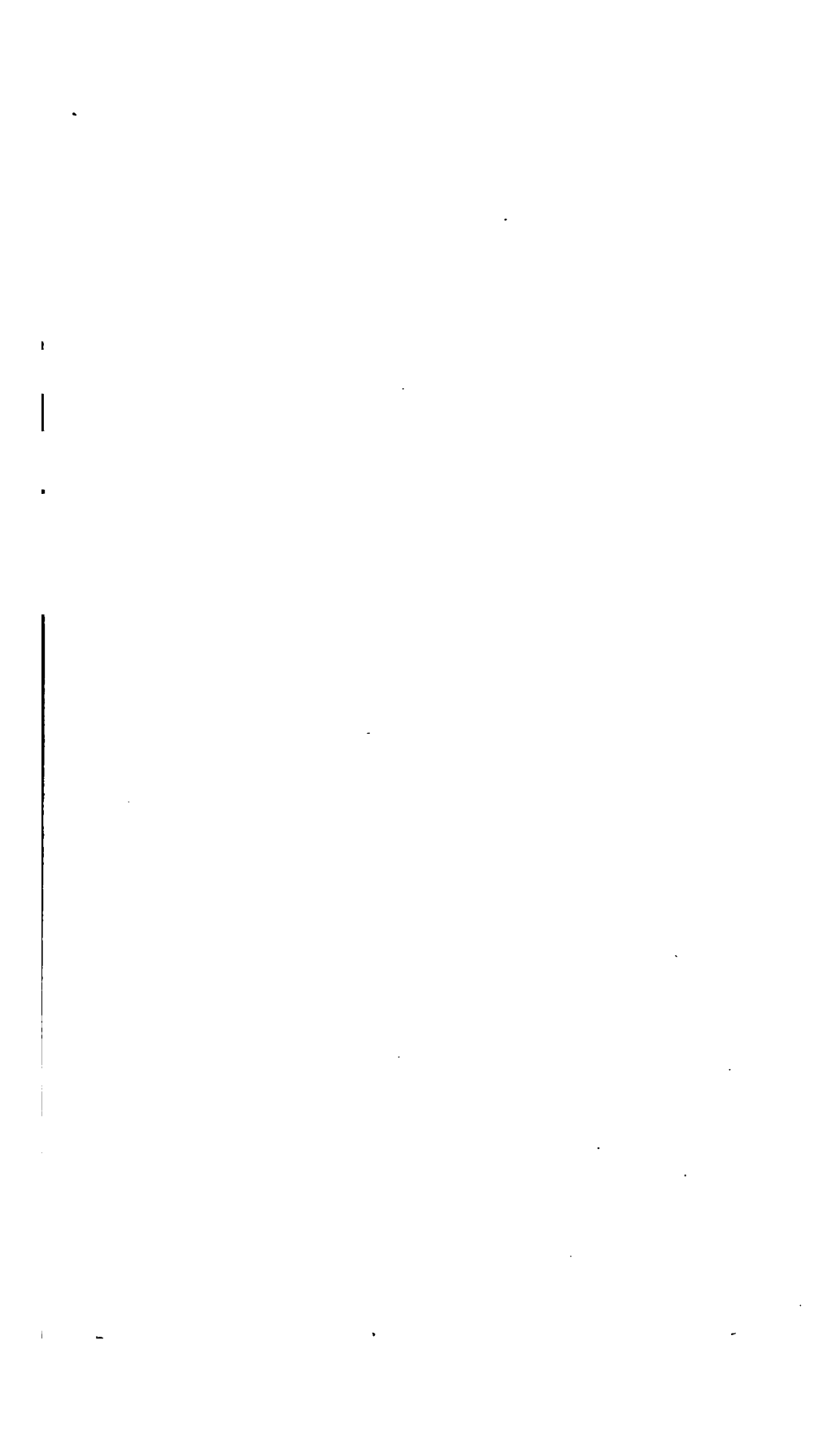
Vertical section of periosteum from a case of acute periostitis.  
× 45.

- a.* Layer, next to the bone, of small granulation cells and pus.
- b.* Fibrous periosteum.
- c.* Blood-vessels, around and about which the infiltrating cells chiefly extend from the deeper to the outer parts.









# INDEX.

*These Indices to the annual volumes are made on the same principle as, and are in continuation of, the General Index to the first fifty-three volumes of the 'Transactions.' They are inserted, as soon as printed, in the Library copy, where the entire Index to the current date may always be consulted.*

**ABDOMINAL SECTIONS, ANTISEPTIC**, one hundred and seventy-two cases of, with remarks on the causes of death in the fatal cases (J. Knowsley Thornton) . . . 139

Percentages of mortality in non-antiseptic and antiseptic cases, 141; groups of cases of ovariectomy, and details of facts relative to the different groups, 142-8; removal of uterine tumours, 148-9; table of complete ovariectomies (antiseptic), 152-61; table of incomplete ovariectomies, exploratory operations, abdominal sections (antiseptic), 162-5.

**ABSCESS in the NECK**, case of, which in its course destroyed a large portion of the carotid artery, jugular vein, and pneumogastric nerve (W. S. Savory) . . . 21

**AMŒBOID MOVEMENTS** of the colourless blood-corpuscles in leuchæmia (J. Cavafy) . . . 31

**ANEURISM of the EXTERNAL CAROTID**, case of, in which after failure of the ligature of the common carotid the old operation was successful (Henry Morris) . . . 1

Reference to Sir Astley Cooper's cases in the 'Transactions,' 1806, and to Mr. Syme's in vols. xliii and xlv of the 'Transactions,' 1-2; clinical notes of the case, 3-10; remarks, 10; Sir A. Cooper's cases, 13; cases of Guthrie, Abernethy, Porter, Wardrop, &c., 16-20.

— **INNOMINATE**, treated by simultaneous distal ligature of the carotid and subclavian arteries, with remarks on the behaviour of a tendon ligature (C. T. Dent) . . . 231

History of the case, 232-4; post-mortem examination by Dr. Isambard Owen, 234; microscopical appearances of the coats of the artery and the action of the tendon ligature, 236-9.

**ANTISEPTIC ABDOMINAL SECTIONS**, see *Abdominal Section, Ovariectomy.*



**AORTA (OX) LIGATURE**, see *Ligature* (ox-aorta).

**ARTERIES, CAROTID and SUBCLAVIAN**, simultaneous distal ligature of, in a case of innominate aneurism (C. T. Dent) . . . . . 231

**ARTERY, CAROTID, &c.**, destruction of a large portion of, by an abscess in the neck (W. S. Savory) . . . . . 21

Two other cases, in one of which the internal jugular, and in the other the femoral artery and vein, were laid open, 21-4; case of C. D., 24-8.

— **COMMON CAROTID**, failure of ligature of, in aneurism of the external carotid (Henry Morris) . . . . . 1

— **EXTERNAL CAROTID**, see *Aneurism* of.

**BAKER, Wm. Marrant.**

Case of urticaria tuberosa, with unusual symptoms . . . . . 289

**BANTOCK, Geo. Granville, M.D.**

On hyperpyrexia after "Listerian" ovariectomy . . . . . 103

**BARKER, Arthur E.**

Nephrectomy by lumbar section . . . . . 257

**BARWELL, Richard.**

Experience and specimens of ox-aorta ligature, and some remarks on the variability of catgut . . . . . 225

**BLOOD-CORPUSCLES, COLOURLESS**, in leuchæmia, amœboid movements of (J. Cavafy) . . . . . 31

**BREAST, DUCT CANCER** of, development of a layer of elastic fibres in (Geo. Thin) . . . . . 243

**CANCER, DUCT**, of the breast, on the development of a layer of elastic fibres in (Geo. Thin) . . . . . 243

**CATGUT**, see *Ligature* (catgut).

**CAVAFY, John, M.D.**

Amœboid movements of the colourless blood-corpuscles in leuchæmia . . . . . 31

**CHAMPNEYS, Francis Henry, M.B.**

On artificial respiration in still-born children; the amount of ventilation secured by different methods . . . . . 41

— On artificial respiration in still-born children, second communication; the expansibility of various parts of the lungs . . . . . 87

**CHEST, DISEASE OF**, further observations on the value of stethometry in the prognosis of (A. Ransome) . . . . . 185

**CHILDREN, STILL-BORN**, see *Respiration* (artificial).

- COLIC, LEAD**, on a probable cause of (C. Hilton Fagge) . 219  
     — see *Lead colic*.
- CROFT, John**.  
     The immediate treatment of fractures of the leg by plaster-of-Paris splints . . . . . 295
- DENT, Clinton T.**  
     Case of innominate aneurism treated by simultaneous digital ligature of the carotid and subclavian arteries, with remarks on the behaviour of a tendon ligature . 231  
     — On the pathology of acute periostitis . . . . . 309
- EXPANSIBILITY** of various parts of the LUNGS in artificial respiration in still-born children (F. H. Champneys) 87
- EYE-BALL**, case of vascular protrusion of (C. Higgins) . 247  
     Report by Mr. Perkins, 247-52; reference to Mr. Rivington's paper on "Pulsating Tumour" in vol. lviii of the 'Transactions,' 252; abstracts of two other cases, by Dr. Morton, of Pennsylvania, and Dr. Frothingham, of Michigan, 253-4.
- FACE**, unusual case of warty growths on the (Geo. Thin) 233
- FAGGE, C. Hilton, M.D.**  
     On a probable cause of lead colic . . . . . 219
- FIBRES, ELASTIC**, development of a layer of, in duct cancer of the breast (Geo. Thin) . . . . . 243
- FRACTURES** of the LEG, the immediate treatment of, by plaster-of-Paris splints (J. Croft) . . . . . 295
- HIGGINS, Charles**.  
     Case of vascular protrusion of the eyeball . . . . . 247
- HYPERPYREXIA**, after Listerian ovariectomy (G. G. Bantock) . . . . . 103
- LEAD COLIC**, on a probable cause of (C. Hilton Fagge) 219  
     Reference to author's paper in vol. lix of 'Transactions,' 1876, on the lead line in the gums, and to M. Cras's work, 'Du Liséré Plombique,' 1875, 219-20; four cases, 221-4.
- LEG**, see *Fractures* of.
- LEUCHÆMIA**, amœboid movements of the colourless blood-corpuscles in (J. Cavafy) . . . . . 31  
     Case of W. W., 31-4; observations on the blood to determine the amœboid movements (with a reference to earlier observations), 34-8; conclusions, 38-40.
- LIGATURE, DISTAL**, simultaneous, of the carotid and subclavian arteries in a case of innominate aneurism (C. T. Dent) . . . . . 231

**LIGATURE, CATGUT, on the variability of (R. Barwell) . 225**

- ox-aorta, experience and specimens of, and remarks on the variability of catgut (R. Barwell) . 225

Reference to two other cases by Dr. Lediard and Dr. Wyeth, 226; summary of cases tied with this ligature, 228; putrefaction in primary manufacture the cause of uncertainty in catgut, 229.

- TENDON, on the behaviour of a (C. T. Dent) . 231

- see *Artery*, common carotid.

**LISTERIAN OPERATION, see *Abdominal sections*; *Ovariectomy*.****LUMBAR SECTION, see *Nephrectomy* by.****MORRIS, Henry.**

On a case of aneurism of the external carotid, in which, after failure of the ligature of the common carotid, the old operation was successful . . . 1

**NECK, see *Abscess* in.****NEPHRECTOMY, by lumbar section (A. E. Barker) . 257**

Reference to previous paper on "Nephrectomy by Abdominal Section" in vol. lxiii, 257; notices of 26 cases since collected, compared with the previous cases in that paper, 258-60; details of the author's two present cases (fatal), 261-8; conclusions deducible from them, 268-71; table of the 26 collected cases (Nos. 29-54), 272-81.

**NERVE, PNEUMOGASTRIC, destruction of a large portion of, by an abscess in the neck (W. S. Savory) . 21****OVARIOTOMY, two hundred, completing one thousand cases of, with remarks on recent improvements in the operation (T. Spencer Wells) . 167**

Table of the cases, 174-83.

**— on HYPERTYREXIA after "Listerian" (G. G. Bantock) 103**

The claim for an absence of pyrexia in "Listerism" disputed from the author's own experience and the reports of other operators, 104-7; chart of temperatures, Listerian and non-Listerian, 105; carbolic acid as a local irritant and as a poison, 108-9; cases illustrative of carbolic acid as a cause of hyperpyrexia, 110-14; case of poisoning by carbolic acid through a granulating surface, 114; susceptibility of the young to the action of carbolic acid (with cases), 115-17; tables of non-Listerian, Listerian, and modified Listerian completed ovariectomies, 120-137.

**OX-AORTA LIGATURE, see *Ligature* (ox-aorta).****PERIOSTITIS, ACUTE, on the pathology of (C. T. Dent) . 309**

Various nomenclature of the disease, 309-10; relations of acute periostitis and osteo-myelitis, 310-12; panaritium periostale or whitlow, 312; cases, 313-16; summary of conclusions, 317-18.

**PLASTER-OF-PARIS SPLINTS**, the immediate treatment of fractures of the leg by (J. Croft) . . . 295

Advantages of these splints.

**RANSOME, Arthur, M.D.**

Further observations on the value of stethometry in the prognosis of chest disease . . . 185

**RESPIRATION, ARTIFICIAL**, in still-born children ; the amount of ventilation secured by different methods (F. H. Champneys) . . . 41

Preface, 41; methods employed, and classification according to their mode of action, 44-5; description of the methods, 45-9; description of apparatus, 50; experiments, 50-74; summary of results, 75; remarks, 76-85; conclusions, 85-6.

— second communication ; the expansibility of various parts of the lungs (F. H. Champneys) . . . 87

Preface, 87-9; tables of experiments, 90-4; remarks, 95-8; analysis of Schmitt's and Joerg's cases, 98-9; conclusions, 100; list of works quoted, 101.

**SAVORY, William Scovell.**

Case of abscess in the neck, which in its course destroyed a large portion of the carotid artery, jugular vein, and pneumogastric nerve . . . 21

**SECTION, ABDOMINAL**, see *Abdominal Section*.

— **LUMBAR**, see *Nephrectomy* by.

**SPLINTS, PLASTER-OF-PARIS**, the immediate treatment of fractures of the leg by (J. Croft) . . . 295

The advantages of these splints, 298-9; description of the apparatus, 299; application, 300; after treatment, 301; list of fractures, as treated with splints, plaster-of-Paris, and bandages at St. Thomas's, 1875-80, 302-4; table of the practice of other metropolitan hospitals, 306.

**STETHOMETRY**, further observations on the value of, in the prognosis of chest disease (A. Ransome) . . . 185

Reference to previous paper in vol. lvi, and to the author's work on stethometry, 185; general diminution of movement respectively in chronic and acute cases, 191; peculiarities of chest movement in chronic and acute cases, 196; compensatory upward and forward movements, 206-8; repeated measurements, 209; table of chronic and acute cases, males and females, chest movements in tenths of an inch, 212-16; diagrams, charts, 1 to 6, 218.

**THIN, George, M.D.**

On the development of a layer of elastic fibres in duct cancer of the breast . . . 243

— an unusual case of warty growths on the face . . . 283